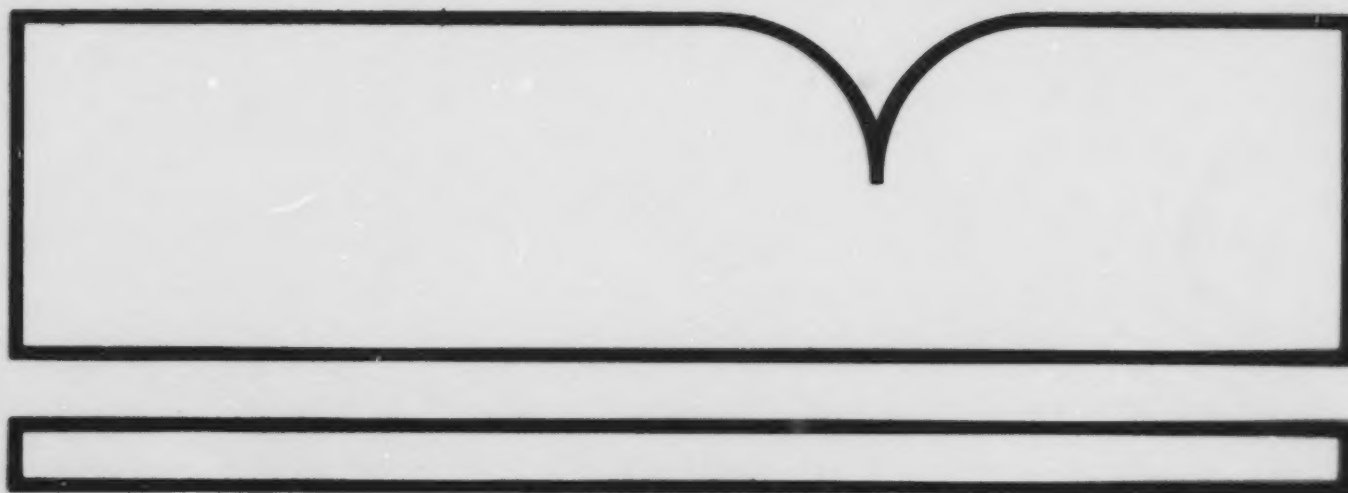


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Programmer's Guide to MOBILE4 (Mobile Source Emission Factor Model)

(U.S.) Environmental Protection Agency, Ann Arbor, MI

Jul 89



U.S. Department of Commerce
National Technical Information Service

NTIS

PROGRAMMER'S GUIDE
to
MOBILE4
(MOBILE SOURCE EMISSION FACTOR MODEL)

JULY 1989

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF MOBILE SOURCES
EMISSION CONTROL TECHNOLOGY DIVISION
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Chapter 1

EXECUTION SUMMARY

1.0 INTRODUCTION

MOBILE4 is a computer model designed to estimate mobile source emission factors by vehicle type, calendar year, and region. The model weights emissions from vehicles of the last 20 model years to obtain fleet emissions as of January 1 of the requested calendar year. The emission factors are adjusted to compensate for tampering, speed, temperature, and other factors.

The MOBILE4 program's MAIN driver loops through three sections: input, calculation, and output. Each of these sections consists of a set of subprograms (subroutines and functions), each of which may in turn call other subprograms to carry out their tasks. Descriptions of the sections are given below, followed by comments on run termination and data storage. The structure diagram and module dictionary (Appendixes A and B, respectively) and the indexes to the source code listing (Appendix C) should aid in following this discussion. Note that all subprogram names are entirely in **bold UPPER CASE**, and that the role of every subprogram is mentioned.

1.1 INPUT

1.1.1 Purpose

The input section of MOBILE4 is responsible for reading in values to the program and preparing the parameters and data to be used subsequently by the calculation section. The section is split into four subsections: **CONSEC**, **ONESEC**, **PARSEC** and **REGMOD**. These subsections control subsequent input and/or output (I/O), supply the one-time data used for all scenarios, specify the individual scenarios to be analyzed, and construct the travel weighting factors, respectively.

1.1.2 Description

On the first pass through the code, **CONSEC** performs the control portion of the input section. **CONSEC** reads in the run title and the 18 control flags. Depending on the value of **PROMPT**, the flags will be read in vertically or horizontally (by routines **GETVER** or **GETHOR**, respectively). The flags dictate what user input may be required, how the analysis will be performed, and what output format and content will be printed.

Next on the first pass, **ONESEC** will check the flags for values indicating that one-time data are expected. The data are read in and screened for being within the ranges expected by the model. If there are no errors, these values then replace the corresponding default values stored in **BLOCK DATA**, or specify features which are only partially initialized in **BLOCK DATA** or not at all. Examples of the first case are tampering rates, registration (**REG**) and mileage accrual rate (**MAR**) distributions, basic emission rates (**BER**), and vehicle miles travelled (**VMT**). Examples of the second case are Inspection/Maintenance (**I/M**) programs and Anti-Tampering Programs (**ATP**). **ONESEC** calls one or more of the subroutines **GETTAM**, **GETVMT**, **GETMRN**, **GETERQ**, **GETIMP**, **GETATP**, **GETNAT**, and **RDCITY** to read in tampering rates, **VMT** mixes, mileage accrual rates and/or registration distributions, alternate basic emission rate equations, **I/M** program parameters, anti-tampering program parameters, refueling loss control parameters, and local area parameters, respectively.

Some of these subroutines call other routines for supportive purposes. **GETERQ** calls **HDCGPM** and **HDCPIC** to convert heavy-duty vehicle gram per brake horsepower-hour emission rates to gram per mile rates, and calls **STOERQ** to store emission rates in the appropriate **MOBILE4** arrays. **GETIMP** uses **GETIMC** whenever the user wishes to read in alternate **I/M** credits. Similarly, **GETATP** calls **ATPAER**, **CALAER**, and **ENFORC** to calculate the basic anti-tampering effectiveness rates, the effect of the anti-tampering program on these rates, and the level of enforcement, respectively.

PARSEC, the third input subsection, is repeated for each scenario. **PARSEC** reads in the required parameters record for the scenario via **GETSC1**. These parameters are region, calendar year, speed, temperature, and hot/cold start percentages. Depending on the values assigned to certain control flags, a new **VMT** mix can be entered via **GETVMT** and/or supplemental correction factors for air conditioning usage, extra load, trailer towing, and humidity may also be read in through **GETALH**. Parameters which describe the local conditions of the scenario, such as minimum and maximum temperatures, base year and in-use (control) fuel Reid Vapor Pressure (**RVP**) and the years of implementation, are processed through the routine **LOCAL**. **LOCAL**, in turn, calls **CALTEM** and **CALUDI** to calculate exhaust, evaporative, and running loss temperatures and various uncontrolled diurnal emission rates. In subsequent passes, only **PARSEC** is called for input.

In all subroutines that read in values for years (e.g., program start year, evaluation year), including **GETERQ**,

GETIMP, GETNAT and RDCITY, the routine YRTEST is called to check if the input is in the allowed range.

REGMOD is called on the first pass and thereafter only when the calendar year, region, or altitude of the scenario changes. REGMOD constructs the travel weighting factors (TF) from the registration and mileage accrual rate distributions. REGMOD calls HDDMYM to build the calendar year dependent HDDV mileage distribution, CEVMPD to generate the miles per day by model year group, and TFCALX to combine the distributions into travel fraction factors.

Note that for any input error encountered, QUITER is called to print out the appropriate error, warning, or comment message(s). Depending on the severity of the error, execution of the program may continue or it can be terminated.

1.2 CALCULATION

1.2.1 Purpose

The calculation section of MOBILE4 generates the requested composite emission factors. Emission factors corrected for non-FTP conditions (speed, temperature, operating mode, etc.) are computed for each of the 20 model years up through the evaluation year. These numbers are weighted together by travel fractions. The resulting numbers (one for each of 8 vehicle classes and one combined pair of classes) are the composite emission factors for the requested pollutant(s) and calendar year. The 8 vehicle class numbers are weighted together by the normalized fleet VMT mix to produce a single all-vehicle emission factor for each pollutant for each calendar year.

1.2.2 Description

The computation of MOBILE4 emission factors is handled by EFCALX. EFCALX calls a number of subprograms, each of which may call a number of other subprograms and so on. Each subprogram performs a step or set of steps in the calculation algorithm.

EFCALX is called on every pass. First, once-per-scenario calls are made to assemble the additive offsets and multiplicative correction factors to be applied to the subsequently computed base emission factors. MOBILE4 uses multiplicative and additive correction factors to compensate for deviations from the standard FTP conditions (assumed in developing the base equation parameters hard-coded in

BLOCK DATA). These calls are summarized in the next paragraph; the more complex cases of **TAMPER** and **BIGCFX** are then described in more detail.

GETCUM figures the average January 1 cumulative mileage distribution. **TAMPER** computes the FTP-condition vehicle tampering offsets, including the countereffects of an ATP. **REFUEL** calculates the refueling loss HC rates. **RVPEXH** uses **OUTPOL** and **IGRVPT** to assign the exhaust HC and CO emission correction factors for fuel volatility (RVP) for the first of three model year groups (MYG). **BIGCFX** generates the adjustments for speed, humidity, trailer towing, air conditioning, extra load, temperature, by-bag RVP effects (MYG 2 and 3 only), methane offsets, corrected (for non-FTP conditions) tampering offsets, and non-FTP operating mode mix.

TAMPER controls the tampering-related group of 16 subroutines and functions, plus calls two utilities used elsewhere in the program. For each vehicle class and model year case, **TAMPER** first sets the parameters affecting the calculations, calling **IMCHEK** at three points to set the I/M keys. **TAMPER** obtains the disablement rates by calling **DISATP**, which decides the ATP case and then calls **DISIMP**, which for each disablement class decides the I/M case and then calls **DISCAL**, which calculates the rate. **TAMPER** calls **EFFGRP** to compute tampering effects group sizes via calls to **ITAMPT**, **TECHO**, **C1T07**, **C8T012**, **A8T011**, **ADJ12**, **ATPEFF**, and **SETEGS**. Note that **ATPEFF** is where the anti-tampering program effectiveness rates are applied to reduce the sizes. **TAMPER** calls **EMIRAT** to assign emission impact rates, using **ITAMPT** again and **OUTPOL**. **TAMPER** calls **BAGEME** to combine group sizes and impact rates into by-bag exhaust emission offsets. Finally, **TAMPER** calls **EVPEME**, and in turn **OTCALC** and **ITAMPT**, to generate the crankcase HC offset and the diurnal and hot soak HC tampering rates. The latter rates are used to calculate the corresponding offsets in **CCEVRT** (see below).

BIGCFX calls a set of **BIGxxx** subroutines to produce its correction factors. **BIGIN1** initializes parameters to be used subsequently by the other **BIGxxx** subroutines. If the user requests the "optional" correction factors, then **BIGALH** produces the corrections for air conditioning usage, extra loading, trailer towing, and humidity, calling model year group look-up (pointer) functions **IGEPTR**, **IGLPTR**, **IGTPTR** and **IGUPTR**. **BIGIN2** assigns the vehicle class-specific parameters and flags, calling pointer function **ISPPTR**. **BIGTCF** computes the multiplicative temperature correction factor using **ITCPTR** and **IEVPTR** and, in some cases, the RVP

correction factor (via **IGRVPT** and **BIGRVP**) and/or the additive temperature CO offset. **BIGSAL** calculates the speed correction factor using **ISPPTR** and combines the result with the "optional" correction factor, if the latter has been computed. Utilizing the operating mode, temperature, and fuel volatility corrections from the prior calls, **BIGMET** (calling **EXMPTR**), **BIGTAM**, and **BIGOMT** (calling **IBFPTR**) compute the methane HC offset, the tampering offset, and the operating mode and temperature correction factor, respectively.

After the offsets and correction factors are assigned, **EFCALX** checks whether or not idle emission factors have been requested. If requested, they are computed via a call to **IDLAL**. **IDLAL** calls **IGSFPT** for the gas/diesel sales fraction and **BEFIDL** for the basic idle emission factor. **BEFIDL** calls **PCLEFT** to get the I/M credit factor, and then either (i) calls **IDLPTR** to obtain the emission factor table model year group pointer or (ii) calls **BEF**, **IERPTR** and **IBFPTR** to compute the factor or (iii) solves a simple equation (with no calls), depending on the pollutant, vehicle class and model year.

If HC emission factors are requested, **EFCALX** next calls **HCCALX** to produce them. **HCCALX** loops through each vehicle type and model year case, computing, correcting, weighting, and adding in that case's contribution to the composite results for the calendar year selected. **IGSFPT** provides the gas/diesel sales fraction used in later result checks. **BEF** extracts the basic exhaust emission rate using **IERPTR**, corrects it for operating mode, temperature, tampering, and methane offsets, and the impact of an I/M program (the last via **PCLEFT** and **IMPTR**). **HCCALX** applies the speed and optional corrections factor and the travel fraction to **BEF**'s result. Light- and heavy-duty gas vehicles' exhaust emission factors are also corrected for RVP. **CCEVRT** returns the evaporative HC emission factor using **IEVPTR**, and including hot soak (**HOTSOK**), diurnal (**DIURNL**), and crankcase (**CRANKC**) HC, weighted by trips per day and miles per day. **HOTSOK** and **DIURNL** each call **EVMAIN** which calculates the requested component through a series of calls to **EVPRE**, **EVSTD**, **EVHI**, **EV81**, **EV85**, **EVUNC** or **EVCERT**, depending on an equation group key, vehicle type, and the applicable emission standard. **RULOSS** provides the running loss HC emission factor using **IRULPT**. The refueling loss HC emission factor is looked up in the previously calculated table. Both the component and the total HC emission factors are saved for subsequent output.

If CO and/or NOx emission factors are requested, **EFCALX** next loops through each pollutant, vehicle type and model year

case, computing, correcting, weighting, and adding in that case's contribution to the composite results for the calendar year selected. IGSFPT provides the gas/diesel sales fraction used in later results checks. BEF extracts the basic exhaust emission rate using IERPTR, corrects it for operating mode, temperature, tampering and CO offsets, and the impact of an I/M program (the last via PCLEFT and IMPTR). EFCALX applies the speed and optional corrections factor and the travel fraction to BEF's result.

After all requested emission factors have been computed, control is transferred to OUTPUT unless errors have occurred. The user is notified of the nature of the errors by a call or calls to QUITER.

1.3 OUTPUT

1.3.1 Purpose

On every successful (no input or calculation errors) scenario pass, OUTPUT routes the results to the report unit, using the format chosen by the user via the OUTFMT flag. Each number (#) of the four possible format options has its own branch in OUTPUT, to subroutines labelled OUTHD# and OUTDT#. Called only on the first pass, OUTHD# echoes the run title via OUTHDR, and the field headers (if a numeric format) or information pertaining to all scenarios (if a descriptive format).

Formats 1 and 2 are the numeric formats. Data written out via formats 1 or 2 are easily read back into post-processors. No narrative is included in the output, aside from the run title and the field descriptors at the top of the output. Formats 3 and 4 are descriptive formats, intended for hard-copy reports. Run and scenario parameter information is echoed out, and field descriptors are supplied for each scenario. Depending on the control flag settings, OUTHD3 or OUTHD4 can call OUTTAM, OUTNEW, OUTIMP, OUTATP, OUTLAP, OUTMTH, and/or USDPTR to print out user-supplied tampering rates, user-supplied basic emission rates, I/M program parameters, anti-tampering program parameters, user-supplied local area parameters, total or non-methane HC values, and user-supplied data names, respectively. When producing these outputs, the routine OUTPOL is called to select which pollutant's values are to be printed.

Chapter 2

MOBILE4 ON PERSONAL COMPUTERS AND NCC-IBM

2.0 INTRODUCTION

This chapter discusses the porting of MOBILE4 from the mainframe environment to IBM and MacIntosh II personal computers, the running of MOBILE4 on those systems, and the running of MOBILE4 on the National Computing Center (NCC) IBM computer. Section 2.1 details the code changes that were required in order to port MOBILE4 to the IBM PC, section 2.2 discusses running MOBILE4 on the IBM PC, and section 2.3 provides similar information pertinent to MOBILE4 on the MacIntosh II computer. Section 2.4 discusses accessing and running MOBILE4 on the NCC IBM.

2.1 PORTING MOBILE4 TO THE IBM PC

The process of porting the MOBILE4 program to the IBM personal computer required a number of code changes. The majority of these changes were necessitated by limitations on the size of individual code segments imposed by many IBM FORTRAN compilers.

To reduce the storage requirements of the program, all comments from the Release MOBILE4 source code should first be deleted.

The remaining code changes are detailed on the following pages. Each block of code that requires revision is first listed under a heading identifying the module (or section) of the program in which it is located. This block is shown twice, first as it appears in the mainframe version of MOBILE4 (under the heading "From:"), then as it appears after the required changes have been made (under the heading "To:").

The equal sign (=) preceding some of the lines indicates those lines that **do not** require revision. Thus they are identical in the "From" and "To" blocks, and can be used as reference points. The lack of a preceding equal sign indicates that a revision (alteration, deletion, or addition) is required.

A blank line in the "From" block indicates the location of a line that must be added to the program. Similarly, a blank line in the "To" section indicates the location of a line that

must be deleted. In the remaining cases where no equal sign precedes the line, comparison of the line in the "From" and "To" sections reveals the alterations required to that line.

An effort was made to keep the required changes to a minimum. For example, in the second set of changes shown on page 2-3, which are to be made in the MAIN section of the program, the second through fifth lines shown maintain the order of the variable array names, deleting some characters (e.g., COMMON /RUNLS2/ from line 3 of the block) and adding a few others (e.g., the comma as the last character of line 2 of the block).

Using these guidelines, the changes shown on pages 2-3 through 2-26 should all be made. When these changes have been completed, copy the revised code onto PC diskettes and use the instructions in section 2.2 of this document.

SECTION: MAIN

From:

```

= CHARACTER*8 NAMFLG,NAMMMR
  CHARACTER*8 USNAME
= CHARACTER*4 NAMRVP,NAMETH,NAMTEM
  CHARACTER*4 NOYES,COMMA,PERIOD
= CHARACTER*4 IMNAME,PROJID,SCNAME
= CHARACTER*1 ASTMCL,AClass
  CHARACTER*1 COLON
= INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG

```

To:

```

= CHARACTER*8 NAMFLG,NAMMMR

= CHARACTER*4 NAMRVP,NAMETH,NAMTEM

= CHARACTER*4 IMNAME,PROJID,SCNAME
= CHARACTER*1 ASTMCL,AClass

= INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG

```

SECTION: MAIN

From:

```

= COMMON /RLCOM3/ RLRATE (20,4)
  COMMON /RUNLS1/ TLVMT (13),TLEMI (13,4,4,4,4),MAXTL
  COMMON /RUNLS2/ TLCAN (13,4,4),TLCAP (13,4,4)
  COMMON /RUNLS3/ RULBAS (4,4,4,4),RULCAN (4,4),RULCAP (4,4)
  COMMON /RUNLS4/ MYGRUL (4,4),MAXRUL
  COMMON /RUNLS5/ RULRVP (4),RULTEM (4)
= COMMON /RVPEX1/ R9G1 (3,2),RG23 (3,3,3,2),TLL (2)

```

To:

```

= COMMON /RLCOM3/ RLRATE (20,4)
  COMMON /RUNLS1/ TLVMT (13),TLEMI (13,4,4,4,4),MAXTL,
* TLCAN (13,4,4),TLCAP (13,4,4),
* RULBAS (4,4,4,4),RULCAN (4,4),RULCAP (4,4),
* MYGRUL (4,4),MAXRUL,
* RULRVP (4),RULTEM (4)
= COMMON /RVPEX1/ R9G1 (3,2),RG23 (3,3,3,2),TLL (2)

```

SECTION: MAIN

From:

```

COMMON /SIZPAR/ NTERMS (4),INDXCS (5,4)
COMMON /STRING/ NOYES (2),COMMA,PERIOD,COLON
COMMON /TAMEQ1/ TAMZML (9,4,2,2),TAMDR (9,4,3,2),MYGTAM (4),IGT5,F50K
To:
COMMON /SIZPAR/ NTERMS (4),INDXCS (5,4)
COMMON /TAMEQ1/ TAMZML (9,4,2,2),TAMDR (9,4,3,2),MYGTAM (4),IGT5,F50K

```

SECTION: MAIN

From:

```

COMMON /TPDCOM/ TPDCO (2,8)
COMMON /USDATA/ USNAME (4,4),NUSD,IUSD (4)
COMMON /VMXCOM/ REGMIX (8),TFNORM (8),VMTMIX (8)
COMMON /YEARS4/ IY1941,IY1960,IY2020

```

```

INERR=0

```

To:

```

COMMON /TPDCOM/ TPDCO (2,8)
COMMON /USDATA/ NUSD,IUSD (4)
COMMON /VMXCOM/ REGMIX (8),TFNORM (8),VMTMIX (8)

OPEN (IOUGEN,FILE='M4INPUT','STATUS='OLD')
OPEN (IOUREP,FILE='M4OUTPUT','STATUS='NEW')
INERR=0

```


SECTION: SUBROUTINE QUITER

From:

= COMMON /QUITXQ/ NIQUIT
COMMON /YEARS4/ IY1941, IY1960, IY2020
= INTEGER ATPFQT, ATPPGM

To:

= COMMON /QUITXQ/ NIQUIT
= INTEGER ATPFQT, ATPPGM

SECTION: SUBROUTINE QUITER

From:

= CHARACTER*13 NAMTMP (7)

= DATA NAMEFF/'L','H'/

To:

= CHARACTER*13 NAMTMP (7)
DATA IY1941, IY1960, IY2020/1941, 1960, 2020/
= DATA NAMEFF/'L','H'/

SECTION: SUBROUTINE GETVER

From:

```

=          CHARACTER*4 NAMRVP
          CHARACTER*4 NOYES,COMMA,PERIOD
=          CHARACTER*1 COLON

```

To:

```

=          CHARACTER*4 NAMRVP

=          CHARACTER*1 COLON

```

SECTION: SUBROUTINE GETVER

From:

```

=          COMMON /NAMES1/ NAMFLG(16),NAMMMR(2,2,8),NAMRVP(4)
          COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
=          INTEGER FLGERR

```

```

=          IF (PROMPT.EQ.2) WRITE (10UASK,200) NAMFLG(1),COLON

```

To:

```

=          COMMON /NAMES1/ NAMFLG(16),NAMMMR(2,2,8),NAMRVP(4)

=          INTEGER FLGERR
          DATA COLON/':'/
=          IF (PROMPT.EQ.2) WRITE (10UASK,200) NAMFLG(1),COLON

```

SECTION: SUBROUTINE GETERQ

From:

=

COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK

COMMON /YEARS4/ IY1941,IY1960,IY2020

=

IF (PROMPT.EQ.2) WRITE (IOUASK,200)

To:

=

COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK

DATA IY1941,IY1960,IY2020/1941,1960,2020/

=

IF (PROMPT.EQ.2) WRITE (IOUASK,200)

SECTION: SUBROUTINE YRTEST

From:

=

SUBROUTINE YRTEST(IY,NERR,IY1,IY2,INERR)

=

COMMON /YEARS4/ IY1941,IY1960,IY2020

To:

=

SUBROUTINE YRTEST(IY,NERR,IY1,IY2,INERR)

=

DATA IY1941,IY1960,IY2020/1941,1960,2020/

I1=IY+1900

SECTION: SUBROUTINE GETIMP

From:

=

COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK

COMMON /YEARS4/ IY1941,IY1960,IY2020

=

NLIM=0

To:

=

COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK

DATA IY1941,IY1960,IY2020/1941,1960,2020/

=

NLIM=0

SECTION: SUBROUTINE GETIMC

From:

= IF (NONUDA.EQ.2) GOTO 60

= READ (IOUIMD,100,END=70,ERR=80) NLIM

To:

= IF (NONUDA.EQ.2) GOTO 60
OPEN (IOUIMD,FILE='M4IMC','STATUS='OLD')
= READ (IOUIMD,100,END=70,ERR=80) NLIM

SECTION: SUBROUTINE GETATP

From:

=

COMMON /IOUCOM/ IOUIMD, IOUGEN, IOUREP, IOUERR, IOUASK

COMMON /YEARS4/ IY1941, IY1960, IY2020

=

IF (PROMPT.EQ.2) WRITE (IOUASK, 200)

To:

=

COMMON /IOUCOM/ IOUIMD, IOUGEN, IOUREP, IOUERR, IOUASK

DATA IY1941, IY1960, IY2020/1941, 1960, 2020/

=

IF (PROMPT.EQ.2) WRITE (IOUASK, 200)

SECTION: SUBROUTINE WTLRUL

From:

=

```

COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
COMMON /RUNLS1/ TLVMT(13),TLEMI(13,4,4,4,4),MAXTL
COMMON /RUNLS2/ TLCAN(13,4,4),TLCAP(13,4,4)
COMMON /RUNLS3/ RULBAS(4,4,4,4),RULCAN(4,4),RULCAP(4,4)
COMMON /RUNLS4/ MYGRUL(4,4),MAXRUL

```

=

```

DIMENSION VMTFRC(3)

```

To:

=

```

COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
COMMON /RUNLS1/ TLVMT(13),TLEMI(13,4,4,4,4),MAXTL,
* TLCAN(13,4,4),TLCAP(13,4,4),
* RULBAS(4,4,4,4),RULCAN(4,4),RULCAP(4,4),
* MYGRUL(4,4),MAXRUL,
* RULRVP(4),RULTEM(4)
DIMENSION VMTFRC(3)

```

=

SECTION: SUBROUTINE GETNAT

From:

= COMMON /RLCOM2/ IOBMY,IVOB(4),IS2SY,NPHASE,S2EFF(4)
COMMON /YEARS4/ IY1941,IY1960,IY2020
= DATA LOWVYR/1989/

To:

= COMMON /RLCOM2/ IOBMY,IVOB(4),IS2SY,NPHASE,S2EFF(4)
DATA IY1941,IY1960,IY2020/1941,1960,2020/
= DATA LOWVYR/1989/

SECTION: SUBROUTINE RDCITY

From:

=

COMMON /TEMPS/ AMBT,TEMMIN,TEMMA,TEMEXH(3),TEMEVP(6),TEMAST(3)

COMMON /YEARS4/ IY1941,IY1960,IY2020

=

DATA UBETH/0.50/,UBMETH/0.100001/,LOWUYR/1970/

To:

=

COMMON /TEMPS/ AMBT,TEMMIN,TEMMA,TEMEXH(3),TEMEVP(6),TEMAST(3)

DATA IY1941,IY1960,IY2020/1941,1960,2020/

=

DATA UBETH/0.50/,UBMETH/0.100001/,LOWUYR/1970/

SECTION: SUBROUTINE GETSCI

From:

```
=      COMMON /TEMPS/  AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
      COMMON /YEARS4/  IY1941,IY1960,IY2020
=      IF (SPDFLG.EQ.2) GOTO 20
```

To:

```
=      COMMON /TEMPS/  AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
      DATA IY1941,IY1960,IY2020/1941,1960,2020/
=      IF (SPDFLG.EQ.2) GOTO 20
```

SECTION: FUNCTION RULOSS

From:

= COMMON /RVPNAT/ ICERSY,RVPCER,RVPLIM(2),RVPDIU(2),PFUL,EINCR
 COMMON /RUNLS3/ RULBAS(4,4,4,4),RULCAN(4,4),RULCAP(4,4)
 COMMON /RUNLS5/ RULRVP(4),RULTEM(4)

= COMMON /TAMOUT/ TAMBAG(3,3,20,4),THS(2,20,4),TDU(20,4),TCC(20,4)

To:

= COMMON /RVPNAT/ ICERSY,RVPCER,RVPLIM(2),RVPDIU(2),PFUL,EINCR
 COMMON /RUNLS1/ TLVMT(13),TLEMI(13,4,4,4,4),MAXTL,
 * TLCAN(13,4,4),TLCAP(13,4,4),
 * RULBAS(4,4,4,4),RULCAN(4,4),RULCAP(4,4),
 * MYGRUL(4,4),MAXRUL,
 * RULRVP(4),RULTEM(4)
 = COMMON /TAMOUT/ TAMBAG(3,3,20,4),THS(2,20,4),TDU(20,4),TCC(20,4)

SECTION: FUNCTION IRULPT

From:

```

=          FUNCTION IRULPT(MY,IVTL)
            COMMON /RUNLS4/ MYGRUL(4,4),MAXRUL

```

```

=          DO 10 IGTL=1,MAXRUL

```

To:

```

=          FUNCTION IRULPT(MY,IVTL)
            COMMON /RUNLS1/ TLVMT(13),TLEMI(13,4,4,4,4),MAXTL,
*          TLCAN(13,4,4),TLCAP(13,4,4),
*          RULBAS(4,4,4,4),RULCAN(4,4),RULCAP(4,4),
*          MYGRUL(4,4),MAXRUL,
*          RULRVP(4),RULTEM(4)
=          DO 10 IGTL=1,MAXRUL

```

SECTION: SUBROUTINE OUTNEW

From:

```

=      SUBROUTINE OUTNEW
      CHARACTER*4 NOYES,COMMA,PERIOD
      CHARACTER*1 COLON
=      COMMON /BASEQ3/ NEWVEH,NEWMYF,NEWMYL,ZMLNEW,DRNEW,KINKS

```

To:

```

=      SUBROUTINE OUTNEW
      CHARACTER*4 NOYES(2)
=      COMMON /BASEQ3/ NEWVEH,NEWMYF,NEWMYL,ZMLNEW,DRNEW,KINKS

```

SECTION: SUBROUTINE OUTNEW

From:

```

=      COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
      COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
=      WRITE (IOUREP,210)

```

To:

```

=      COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
      DATA NOYES/'No ','Yes '/
=      WRITE (IOUREP,210)

```

SECTION: SUBROUTINE OUTIMP

From:

```

=          CHARACTER*4 IMNAME
          CHARACTER*4 NOYES,COMMA,PERIOD
          CHARACTER*1 COLON
=          COMMON /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER(2),CRIM
To:
=          CHARACTER*4 IMNAME
          CHARACTER*4 NOYES(2)

=          COMMON /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER(2),CRIM

```

SECTION: SUBROUTINE OUTIMP

From:

```

=          COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
          COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
=          CHARACTER*4 TFREQ(2,2),TINTYP(7,3),TTYPE(4,3)
To:
=          COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK

=          CHARACTER*4 TFREQ(2,2),TINTYP(7,3),TTYPE(4,3)

```

SECTION: SUBROUTINE OUTIMP

From:

```

=          3          'Manu','al d','ecen','tral','ized',' ','/'
=          WAIVER(1)=WAIVER(1)*100.
To:
=          3          'Manu','al d','ecen','tral','ized',' ','/'
          DATA NOYES/'No ','Yes '/
=          WAIVER(1)=WAIVER(1)*100.

```


SECTION: SUBROUTINE OUTATP

From:

```

=          SUBROUTINE OUTATP
            CHARACTER*4 NOYES,COMMA,PERIOD
            CHARACTER*1 COLON
=          INTEGER ATPPGM,ATPFQT,DISTYP

```

To:

```

=          SUBROUTINE OUTATP
            CHARACTER*4 NOYES(2),COMMA
=          INTEGER ATPPGM,ATPFQT,DISTYP

```

SECTION: SUBROUTINE OUTATP

From:

```

=          COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
            COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
=          CHARACTER*8 VNAME(4),FQT(2)

```

To:

```

=          COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
=          CHARACTER*8 VNAME(4),FQT(2)

```

SECTION: SUBROUTINE OUTATP

From:

```

=          DATA FQT /'Annual ','Biennial'/

```

```

=          WRITE (IOUREP,200) LAPSY,LAPIST,LAPLST

```

To:

```

=          DATA FQT /'Annual ','Biennial'/
            DATA NOYES/'No ','Yes '/
            DATA COMMA/',' '/
=          WRITE (IOUREP,200) LAPSY,LAPIST,LAPLST

```

SECTION: SUBROUTINE USDPTR

From:

```
=      INTEGER ALHFLG
=      CHARACTER*8 USNAME
=      COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
=      COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
=      COMMON /USDATA/ USNAME(4,4),NUSD,IUSD(4)
=      IF (TAMFLG.EQ.1.AND.NEWFLG.EQ.1.AND.MYMRFG.EQ.1) GOTO 99
```

To:

```
=      INTEGER ALHFLG

=      COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
=      COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
=      COMMON /USDATA/ NUSD,IUSD(4)
=      IF (TAMFLG.EQ.1.AND.NEWFLG.EQ.1.AND.MYMRFG.EQ.1) GOTO 99
```

SECTION: SUBROUTINE OUTDT3

From:

```

=      INTEGER PRTFLG,HCFLAG
      CHARACTER*8 USNAME
      CHARACTER*4 NOYES,COMMA,PERIOD
      CHARACTER*1 COLON
=      COMMON /ALUHIN/ AC,XLOAD(3),TRAILR(3),ABSHUM,DB,WB
To:
=      INTEGER PRTFLG,HCFLAG
      CHARACTER*8 USNAME(4,4)
      CHARACTER*4 NOYES(2),COMMA,PERIOD
=      COMMON /ALUHIN/ AC,XLOAD(3),TRAILR(3),ABSHUM,DB,WB

```

SECTION: SUBROUTINE OUTDT3

From:

```

=      COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
      COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
=      COMMON /TEMPS/ AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
      COMMON /USDATA/ USNAME(4,4),NUSD,IUSD(4)
=      COMMON /VMXCOM/ REGMIX(8),TFNORM(8),VMTMIX(8)
To:
=      COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
=      COMMON /TEMPS/ AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
      COMMON /USDATA/ NUSD,IUSD(4)
=      COMMON /VMXCOM/ REGMIX(8),TFNORM(8),VMTMIX(8)

```

SECTION: SUBROUTINE OUTDT3

From:

```

=      DATA NAMEVP/'Hot Soak ','Diurnal ','Multiple ','Crankcase'/

```

```

=      CALL OUTPOL(IP1,IP2)
To:
=      DATA NAMEVP/'Hot Soak ','Diurnal ','Multiple ','Crankcase'/
      DATA NOYES/'No ','Yes '/
      DATA COMMA/',' ',PERIOD/',' '/
      DATA USNAME/' tamper','ng and m','isfuelin','g rates ',
*      ' basic ','exhaust ','emission','s rates ',
*      ' mileag','e accrua','l distri','butions ',
*      ' veh reg','istratio','n distri','butions '/
=      CALL OUTPOL(IP1,IP2)

```

SECTION: SUBROUTINE OUTDT4

From:

```

=      INTEGER PRFLG,HCFLAG
      CHARACTER*8 USNAME
      CHARACTER*4 NOYES,COMMA,PERIOD
      CHARACTER*1 COLON
=      COMMON /ALUHN/ AC,XLOAD(3),TRAILR(3),ABSHUM,DB,WB

```

To:

```

=      INTEGER PRFLG,HCFLAG
      CHARACTER*8 USNAME(4,4)
      CHARACTER*4 NOYES(2),COMMA,PERIOD
=      COMMON /ALUHN/ AC,XLOAD(3),TRAILR(3),ABSHUM,DB,WB

```

SECTION: SUBROUTINE OUTDT4

From:

```

=      COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
      COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
=      COMMON /TEMPS/ AMBT,TEMIN,TEMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
      COMMON /USDATA/ USNAME(4,4),NUSD,IUSD(4)
=      COMMON /VMXCOM/ REGMIX(3),TFNORM(8),VMTMIX(8)

```

To:

```

=      COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
=      COMMON /TEMPS/ AMBT,TEMIN,TEMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
      COMMON /USDATA/ NUSD,IUSD(4)
=      COMMON /VMXCOM/ REGMIX(8),TFNORM(8),VMTMIX(8)

```

SECTION: SUBROUTINE OUTDT4

From:

```

=      DATA NAMNMH/'Total ','No-Mth '/

```

```

=      CALL OUTPOL(IP1,IP2)

```

To:

```

=      DATA NAMNMH/'Total ','No-Mth '/
      DATA NOYES/'No ','Yes '/
      DATA COMMA/','/,PERIOD/','/
      DATA USNAME/' tamper','ng and m','isfuelin','g rates ',
*          ' basic ','exhaust ','emission','s rates ',
*          ' mileag','e accrua','l distri','butions ',
*          ' veh reg','istratio','n distri','butions '/
=      CALL OUTPOL(IP1,IP2)

```

SECTION: BLOCK DATA BD16

From:

```
=      COMMON /QUITXQ/ N1QUIT
      COMMON /YEARS4/ 1Y1941,1Y1960,1Y2020
      DATA IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK/4,5,3*6/
=      DATA 1VPTRL/1,2,3,0,4,5,0,6/
To:
=      COMMON /QUITXQ/ N1QUIT

      DATA IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK/4,5,6,2*0/
=      DATA 1VPTRL/1,2,3,0,4,5,0,6/
```

SECTION: BLOCK DATA BD16

From:

```
=      DATA N1QUIT/1/
      DATA 1Y1941,1Y1960,1Y2020/1941,1960,2020/
=      END
To:
=      DATA N1QUIT/1/
=      END
```

SECTION: BLOCK DATA BD24

From:

```

= CHARACTER*8 NAMFLG,NAMMMR
  CHARACTER*8 USNAME
= CHARACTER*4 NAMRVP,NAMETH,NAMTEM
  CHARACTER*4 NOYES,COMMA,PERIOD
  CHARACTER*1 COLON
= COMMON /NAMES1/ NAMFLG(16),NAMMMR(2,2,8),NAMRVP(4)
= COMMON /NAMES2/ NAMETH(2),NAMTEM(2)
  COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
  COMMON /USDATA/ USNAME(4,4),NUSD,IUSD(4)
= DATA NAMFLG/

```

To:

```

= CHARACTER*8 NAMFLG,NAMMMR

= CHARACTER*4 NAMRVP,NAMETH,NAMTEM

= COMMON /NAMES1/ NAMFLG(16),NAMMMR(2,2,8),NAMRVP(4)
= COMMON /NAMES2/ NAMETH(2),NAMTEM(2)
  COMMON /USDATA/ NUSD,IUSD(4)

= DATA NAMFLG/

```

SECTION: BLOCK DATA BD24

From:

```

= DATA NAMETH/' eth','meth',/NAMTEM/'mini','maxi'/
  DATA NOYES/'No ','Yes '/
  DATA COMMA/',' ',/PERIOD/'. ',/COLON/': '/
  DATA USNAME/' tamperi','ng and m','isfuelin','g rates ',
*           ' basic ','exhaust ','emission','s rates ',
*           ' mileag','e accrua','l distri','butions ',
*           ' veh reg','istratio','n distri','butions '/
= DATA NUSD,IUSD/5*0/

```

To:

```

= DATA NAMETH/' eth','meth',/NAMTEM/'mini','maxi'/

```

```

= DATA NUSD,IUSD/5*0/

```


SECTION: BLOCK DATA BD34

From:

```

=      BLOCK DATA BD34
COMMON /RUNLS1/ TLVMT(13),TLEMI(13,4,4,4,4),MAXTL
COMMON /RUNLS2/ TLCAN(13,4,4),TLCAP(13,4,4)
COMMON /RUNLS3/ RULBAS(4,4,4,4),RULCAN(4,4),RULCAP(4,4)
COMMON /RUNLS4/ MYGRUL(4,4),MAXRUL
COMMON /RUNLS5/ RULRVP(4),RULTEM(4)
=      DIMENSION

```

To:

```

=      BLOCK DATA BD34
COMMON /RUNLS1/ TLVMT(13),TLEMI(13,4,4,4,4),MAXTL,
* TLCAN(13,4,4),TLCAP(13,4,4),
* RULBAS(4,4,4,4),RULCAN(4,4),RULCAP(4,4),

* MYGRUL(4,4),MAXRUL,
* RULRVP(4),RULTEM(4)
=      DIMENSION

```

2.2 RUNNING MOBILE4 ON THE IBM PERSONAL COMPUTER

EPA has distributed copies of the PC version of MOBILE4 to all EPA Regional Offices and a number of other parties, accompanied by a two-page instruction sheet for loading and running the program. This section essentially repeats that material, and is applicable for those who used the procedure detailed in section 2.1 to create a PC version from the mainframe tape version of MOBILE4.

The PC version was distributed on a set of three diskettes. (The entire set of files can also be recorded onto a single high-density diskette.) These three 360K diskettes contained a modified version of Release MOBILE4 that can be loaded to and run on an IBM-PC (either XT or AT, or clones). The diskettes contained the modified source code, executable (object) code, User's Guide example input files, and the alternate high-altitude area I/M credit file. The executable code was compiled and linked using the Microsoft FORTRAN 4.01 package. Compiler options were set so that a math co-processor will be used if present in the computer.

The storage required for the executable code is larger than 360K, therefore the DOS command **BACKUP** was used to save the files on the disks. The DOS command **RESTORE** will be used to place the files on your hard disk system. Before beginning, however, check to ensure that approximately 1000K of free memory space is available on your hard disk system. Next, follow steps 1 to 6 below to load the files onto your machine. (If using a single high-density diskette, follow steps 1 to 4 only.)

(Note: All DOS commands are indicated by **boldface**.)

- 1) Create a directory on your hard Drive C:
using this command: **MD MOBILE4**
- 2) Change the active directory using this command:
CD MOBILE4
- 3) Place Disk #1 in Drive B:
- 4) Type this command: **RESTORE B: C:*.***
and then follow the prompts
- 5) When prompted, place Disk #2 in Drive B:
- 6) When prompted, place Disk #3 in Drive B:

When the **RESTORE** is completed, the following 19 files will reside in the MOBILE4 directory:

Source files

S1.FOR	S2.FOR	S3.FOR	S4.FOR
S5.FOR	S6.FOR	S7.FOR	S8.FOR

Compile and Link batch filesExecutable file

COMPIT.BAT

LINKIT.BAT

MOBILE4.EXE

User's Guide example input filesHigh-altitude alternate
I/M credits file

EX1A.DAT

EX1B.DAT

EX1C.DAT

EX1D.DAT

EX2.DAT

EX3.DAT

EX4.DAT

IMCHI.DAT

The modified source code is supplied over eight (8) files, each occupying less than 64K of memory space. Most IBM FORTRAN compilers cannot process code segments larger than 64K. To reduce the storage requirements of the program, all comments from the Release MOBILE4 source code have been removed.

The two batch files COMPIT.BAT and LINKIT.BAT are included to show how the executable file was created using the Microsoft FORTRAN package. These files contain the Microsoft FORTRAN Compiler and Linker command options used to produce the MOBILE4 executable file MOBILE4.EXE. A brief summary of these options is given here. For a much more detailed discussion of the options, please refer to your FORTRAN User's Guide.

The compiler command stream in the file COMPIT.BAT consists of the line:

```
f1 /FPc /Od /AH /c S*.FOR
```

The options selections shown have the following meanings:

```
f1    invokes the FORTRAN compiler.
/FPc  instructs the Compiler to generate calls such that if a
      math coprocessor is present, it will be used to speed up
      floating point calculations.
/Od    tells the Compiler not to perform code optimization.
      (Tests showed that MOBILE4 did not run properly when the
      code was optimized.)
/AH    tells the Compiler to use the Huge Memory Model. This
      memory model allows arrays to be greater than 64K in
      size. At present, the arrays in MOBILE4 are all less
      than 64K. However, user modifications to the code can
      quickly cause this array size limitation to be exceeded,
      thus requiring the Huge option. In addition, different
      versions of the Microsoft FORTRAN compiler sometimes
```

failed with the smaller Large Memory Model. Thus for safety, the Huge option is recommended for compiling MOBILE4.

/c instructs the Compiler to perform just the compilation, not the compiler-and-link operation (which is the default).

Finally, the **S*.FOR** instructs the compiler to use all source files beginning with **S** and ending with **.FOR**. MOBILE4 is supplied as eight source code files named **S1.FOR**, **S2.FOR**, ..., **S8.FOR**. The Compiler will automatically generate files named **S1.OBJ**, **S2.OBJ**, etc. from these files.

The Linker command stream in **LINKIT.BAT** consists of the line:

```
link /SE:300 S1.OBJ+S2.OBJ+S3.OBJ+S4.OBJ+S5.OBJ+S6.OBJ+S7.OBJ+
          S8.OBJ,MOBILE4;
```

The options selections given have the following meanings:

link	invokes the FORTRAN linker.
/SE:300	tells the Linker that there are approximately 300 code segments in the compiled MOBILE4 program. The Linker's default number of 128 segments is too small for proper linkage, thus requiring this option. The value of 300 is slightly larger than is necessary for proper running of the program and provides room for user modification.
S1.OBJ+...+S8.OBJ	tells the Linker to use these eight files as input for linking. The files are explicitly named so that proper ordering of the MOBILE4 structure is maintained.
MOBILE4;	tells the Linker to name the executable file it produces MOBILE4.EXE .

To run the program, type **MOBILE4** at the DOS prompt. The program is hardcoded to accept input from a file named **M4INPUT** only. Output is hardcoded to be directed to a file named **M4OUTPUT** only. Similarly, alternate I/M credits are hardcoded to be read from a file named **M4IMC** only. The input file(s) **M4INPUT** and **M4IMC** (if used) must exist before running. The output file **M4OUTPUT** must not exist prior to running the program. If this protocol is not followed, an appropriate DOS error message will appear and the program will fail to execute.

If you encounter difficulties in loading the program onto your computer using these instructions, you may contact EPA for assistance, at (313) 668-4462 or FTS 374-8462.

2.3 PORTING MOBILE4 TO AND RUNNING MOBILE4 ON THE MACINTOSH II PERSONAL COMPUTER

The directions provided in this section also appear in the User's Guide to MOBILE4, section 4.6.

These directions assume that the MacIntosh computer being used has 512K bytes of free memory, a hard disk drive, and ABSOFT Corporation's MacFORTRAN or MacFORTRAN/020 compiler.

The first step is to port the source code to the MacIntosh unit. To accomplish this, an error-checking protocol (such as KERMIT) should be used. The MOBILE4 source code should be transmitted such that an ASCII text file with no hidden characters (such as tabs) is created.

Once transferred, the code must be slightly revised to accomodate the MacIntosh FORTRAN environment. These required modifications include the insertion of file-opening statements and screen/keyboard connections, as detailed below:

(1) Insert the following lines controlling file input/output immediately preceding the statement `INERR=0` (line 1176 of the code as listed in Appendix C), in the MOBILE MAIN program module:

```
OPEN(5,FILE='M4INPUT',STATUS='OLD')
OPEN(6,FILE='M4OUTPUT',STATUS='NEW')
```

(2) If alternate inspection/maintenance credit matrices are also to be read as input, insert the following line immediately after the statement `IF(NONUDA.EQ.2) GO TO 60` (line 115037 in the Appendix C code listing), in Subroutine GETIMC);

```
OPEN(4,FILE='M4IMC',STATUS='OLD')
```

(3) Finally, alter the initialization line for screen/keyboard I/O in `BLOCK DATA SUBPROGRAM 16` (line 516076 in the Appendix C listing), to read:

```
DATA IOUIMD, IOUGEN, IOUERR, IOUSAK/4,5,6,2*9/
```

These changes direct MOBILE4 to always read the program input data from a file named M4INPUT, and to always write the program output to a file named M4OUTPUT. Similarly, if the alternate I/M credit input option is used, then the alternate credit matrices will always be read from a file named M4IMC. Lastly, the third change above directs all prompting and diagnostic (comment, warning, and error) messages to the Macintosh screen (logical I/O device unit number 9).

After the changes outlined above have been made, invoke the FORTRAN compiler. If the Macintosh unit being used has a math co-processor, select through the Options menu.

When the compilation is completed, the "heap" space for the resulting MOBILE4 application must be adjusted. To do so, click on the MOBILE4 application icon one time, then select the FILE option from the Macintosh FINDER menu (not the compiler menu). Highlight the GET INFO choice, and note the application size value in the lower right portion of the window. If it is less than 512K, increase it to 512K. The MOBILE4 application is now ready for use.

Before running the program, place the MOBILE4 input data prepared in accordance with the instructions provided in the User's Guide in the file named M4INPUT. Next, check to ensure that the M4OUTPUT file is empty. (If it contains data or other results that you wish to maintain, rename it so that it is not overwritten with the output of the pending MOBILE4 run.) To execute the program, launch the application by double-clicking its icon. The results will be in the M4OUTPUT file.

A few tests were run using the IBM PC and Macintosh versions of the model in order to obtain a sense of the required execution times. For scenarios similar to those included in the example runs from Chapter 5 of the User's Guide, the following times were observed:

Number of Scenarios	MacII Math	12 MHz IBM-AT	Time per Scenario	
	Co-processor (sec)	Math Co-processor (sec)	Mac (sec)	IBM (sec)
1	12	12	12.0	12.0
5	69	68	13.8	13.6
10	137	134	13.7	13.4
25	275	268	13.7	13.4

2.4 RUNNING MOBILE4 ON THE NCC-IBM COMPUTER

The following instructions explain how to sign on an run MOBILE4 on the National Computing Center (NCC) IBM system. This section assumes that the reader has some knowledge about working in the mainframe time-sharing environment in general, and is knowledgeable about MOBILE4 in particular.

2.4.1 Signing On

The first step in getting access to MOBILE4 on the NCC IBM is to power-up the direct connect terminal. Upon doing so, the screen will display the "welcome menu" shown below:

WELCOME TO THE
U. S. ENVIRONMENTAL PROTECTION AGENCY
TELECOMMUNICATIONS NETWORK

ENTER COMMAND ON M FOR MENU

If the screen is blank, press the ENTER key and this herald will appear. Second, type TSO to access the IBM using this interface.

Next, the system will ask for your USER ID. Enter your three-letter ID. Once it has been accepted, the system will display the TSO/E LOGON MENU, which prompts you for entry of your password. Type in the password, and when prompted, your FIMAS code. Generally, the FIMAS code for MOBILE4 runs is DAASM. Finally, after you have entered your FIMAS code, you are ready to create a MOBILE4 input file.

2.4.2 Creating a MOBILE4 Input File

You can use the EDIT facility to enter and/or correct a MOBILE4 input file. There is a baseline sample input file on the system in the file "KADSAME.M4INPUT". This file can be copied into a file called M4INPUT and then edited to suit the requirements of the user. Access an existing input file name M4INPUT by typing EDIT M4INPUT OLD. Type LIST to list the contents of this file.

This sequence, assuming that the example contained in KADSAME.M4INPUT has been copied into a file named M4INPUT, and the system responses that follow are shown below. Your input appears in **boldface UPPERCASE** lettering, and the system responses appear in regular type.

```

ready
EDIT M4INPUT OLD
qed
LIST
00010 1          PROMPT - vertical flag input, no prompting
00020 MOBILE4 Example 1a: OUTFMT = 1 (long (220 column) numeric outpu
00030 1          TAMFLG - default tampering rates
00040 1          SPDFLG - one speed per scenario for all IV
00050 1          VMFLAG - default vmt mix
00060 1          MYMRFG - default registration and mileage accrual r
00070 1          NEWFLG - default exhaust emission rates
00080 1          IMFLAG - no I/M program
00090 1          ALHFLG - no additional correction factor inputs
00100 1          ATPFLG - no anti-tampering program
00110 1          RLFLAG - uncontrolled refueling losses
00120 1          LOCFLG - read in local area parameters as 2nd req s
00130 1          TEMFLG - calculate exhaust temperatures
00140 1          OUTFMT - long 220 column numeric output format
00150 4          PRTFLG - print exhaust HC, CO, and NOx emission fac
00150 1          IDLFLG - do not print idle emission results
00160 2          NMHFLG - print NMHC
00170 2          HCFLAG - print HC components
00180 1 80 19.6 75.0 20.6 27.3 20.6          1st req sc re
00190 Ann Arbor      MI C 60. 84. 11.5 11.5 20      LAP rec: SCNAME,
END OF DATA

```

The actual input data to be read by MOBILE4 follows the line numbers at left. The additional information at the right will not be read by the program, but is listed in the input file as an aid in reading and interpreting the input values. Several of the lines (00020, 00060, 00120, 00150, 00180, 00190) continue beyond what is shown above, since the line length in the input file can be up to 220 columns. For example, the complete line 00020 would appear as:

```

00020      MOBILE4 Example 1a: OUTFMT = 1 (long (220 column)
        numeric output format)

```

displayed on one line.

If this file is satisfactory, type **END SAVE** and the system will save this file and respond first with **SAVED**, then with **READY**. If you want to change this file, use the editor's **CHANGE** command, as illustrated below:

```

Prototype command:      C ##### /OLD VALUE/NEW VALUE

```

where:

#####	is the line number to be changed
OLD VALUE	is the original character string in the file
NEW VALUE	is the desired character string in the file

Thus, to change the value of line 00150 from a "4" to a "3", type the command:

C /4/3/

and the system will change the line.

Once you have modified the file to your satisfaction, type **END SAVE** and the system will respond with **SAVED**, followed by **READY**.

2.4.3 Running MOBILE4

Execution of MOBILE4 on the NCC IBM has been completely automated, provided that the input data file for the program has been named M4INPUT.

To run MOBILE4, type **EXEC KADSAME.M4RUN** and, after a short pause, the output will appear on the screen. If the screen fills, the system will pause and allow you to examine the results until such time as you press the ENTER key.

2.4.4 Signing Off

When you are finished, sign off of the system by typing **LOGOFF**. The computer will soon display the amount of money spent and the time used. After approximately one minute, the screen will clear and display the original EPA "welcome menu."

Chapter 3

POTENTIAL MODIFICATIONS TO MOBILE4

3.0 INTRODUCTION

This chapter describes some of the more common changes that users might make to their copy of the MOBILE4 program.

The changes discussed in this chapter are suggestions for: (a) conversion of MOBILE4 to a callable subroutine, (b) addition of by-model-year emission factor extraction and output, and (c) miscellaneous MOBILE4 modifications (user convenience alterations, reduction of computer resource requirements, etc.)

3.1 MOBILE4 AS A SUBROUTINE

3.1.1 Purpose

There are at least two good reasons to reconfigure MOBILE4 from a stand-alone program to a callable subroutine. First, the Control flags and One-Time Data are input exactly once into stand-alone MOBILE4. Since these values cannot be altered once input, multiple runs of MOBILE4 are required to change values of Control flags or One-Time Data values. Multiple runs incur the additional overhead of loading the program each time and can be inconvenient to the user. The user may wish instead to revise MOBILE4 to be capable of "starting over" with a new input stream, after encountering an appropriate input cue.

Second, the user may find it more efficient to have another program call MOBILE4 and subsequently directly access the emission factor results in their common block locations, instead of writing out the results and then reading them back into a post-processor program. In fact, any variable or array in any of the MOBILE4 common blocks can become usable by the calling program upon return from the MOBILE4 call simply by declaring that common block in the calling program routine that is to use the needed values. Aggregation or comparison of data from several calls thus can be handled by the calling program.

3.1.2 Method

This section outlines the steps necessary to convert the stand-alone MOBILE4 program to a callable subroutine.

Make MOBILE4 a FORTRAN SUBROUTINE. Insert as the first non-comment line of the code the following statement:

SUBROUTINE MOBIL4

There are two STOP statements in MOBILE4, one in MAIN and one in subroutine QUITER. Change the STOP statement in MAIN to a RETURN. Change the STOP statement in QUITER to a RETURN, preceded by the setting of an input error return code. For those QUITER calls sending down STOP MCODEs, alter the code to route control back to the return code (passed via a new common block) for the STOP condition and proceed accordingly.

Create a new parameter JCALL, stored in a new common block and initialized to 1 in new BLOCK DATA 35. Identify all variables and arrays modifiable but not first initialized during execution. These at-risk data will generally be the One-Time Data parameters and data, but also include certain control and output parameters. Create a save area for these data values by setting up new common blocks with renamed copies of all the to-be-saved variables and arrays. Write a subroutine BDSAVE which saves the original (compiled) values into the copies. Write a subroutine REINIT which restores the saved values to original variables and arrays. Insert as the first 3 runtime commands in subroutine MOBIL4:

```
IF(JCALL.EQ.1) CALL BDSAVE
IF(JCALL.EQ.2) CALL REINIT
JCALL=2
```

On the first call, the at-risk data will be copied into the save area. On the second and subsequent calls, the data will be copied from the save area back to their original locations.

(Note: An alternative to setting up an internal save area is to read in the at-risk data on each call.)

If the standard MOBILE4 written output is not desired, comment out the calls to OUTHDR and OUTPUT. Remove the output code block (lines 401000 to 418999 by Appendix C numbering), to reduce the size of the program.

The conversation is now complete. Execute the subroutine by inserting in the calling program the statement:

```
CALL MOBIL4
```

Execution of a single call terminates normally when the READ for the first required scenario record encounters an

end-of-file condition or reads in a value of 0 for IREJN. The IREJN check already exists in MOBILE4, allowing several input streams to reside in the same file by insertion of a line of blanks or zeroes between each pair of input streams. Alternatively, input can be redirected between MOBILE4 calls by system calls to reassign input unit 5 to a different file.

The method described above was implemented for MOBILE3. It has not yet been applied to MOBILE4, but the only problem anticipated is with the IBM PC/AT-compatible version of MOBILE4. See Section 3.3.3 for details.

3.2 BY-MODEL-YEAR VERSION OF MOBILE4

3.2.1 Purpose

The OUTFMT control flag of MOBILE4 allows the user to select from a set of four output formats. The emission factor information of the four formats is identical, except for the number of decimal places printed and the layout of the fields. Only the aggregate emission factors are printed. These numbers are the single model year emission factors weighted by the corresponding travel fractions and correction factors, and then summed across the 20-model-year window ending in the requested evaluation year.

A by-model-year version of MOBILE4 optionally retrieves and prints the unsummed individual model year emission factors and their components. The components for a given emission factor include the travel fraction, the cumulative mileage, the uncorrected (base) emission factor, and the various correction factors and offsets. The purpose of outputting these data is to permit a more detailed assessment of the causes of the aggregate results. For example, the user may want to see the by-model-year emission reduction due to the implementation of a proposed I/M program, doing several such runs in order to compare the consequences of alternative I/M strategies with respect to vehicles of a given single model year.

3.1.2 Method

This section outlines the steps necessary to convert release MOBILE4 to by-model-year MOBILE4. These steps can be modified to suit the user's needs. For example, if done in conjunction with conversion to MOBILE4 as a subroutine, there is no need to add by-model-year output code. Instead, the results can be passed up to the calling program via common blocks

for processing. Picking the by-model-year option will simply tell MOBILE4 to save that information into those common blocks.

In any event, the first step is to modify the input section (line range 101000-199999 by Appendix C numbering). Add a fifth output format option (OUTFMT = 5). Selection of this option will then trigger the by-model-year sections of the code. In subroutine ONESEC, input a vehicle class inclusion vector (1 = no and 2 = yes) to decide for which classes the by-model-year information is to be saved and printed.

In the emission factor calculation section (line range 201000-299999 by Appendix C numbering), save the desired by-model-year information. In some cases, existing arrays already hold the data. The travel fractions for all 20 model years and 8 vehicle classes are in array TF. In other cases, a new array has to be declared in a common block and then the values saved by new assignment statements in the code. The evaporative component of HC can be assigned to new array BYEVAP(IDX,IV), declared as BYEVAP(20,8) in new common block /BYMYI1/.

In the output section (line range 401000-499999 by Appendix C numbering), add a new subroutine OUTDT5. This routine will be called to print the requested by-model-year information. Typically, the program will print the header and aggregate information first and then the by-model-year tables. For example, if format 3 is used for the aggregate information, the branch and call sequence in OUTPUT is:

```
GOTO(10,20,30,40,50),OUTFMT
.
.
.
50 IF (INITPR.EQ.1) CALL OUTHD3
   CALL OUTDT3(ICY)
   CALL OUTDT5(ICY)
```

In OUTDT5, print one table per vehicle class, with one model year's results per line plus an aggregate results line. The model year lines are ordered newest (ICY) to oldest model year. With table and field headings, formatting, and a reasonable amount of white space, two tables will fit per page.

Each model year line will consist of at least 4 blocks of fields, the first for data that applies to all pollutants and then one for each pollutant. Information in the first block is the model year, TF, and accrued mileage (by a typical vehicle

of that class and age). Likely fields for a given pollutant are the base emission factor, speed and optional correction factor (SALHCF), tampering offset, I/M credit, BYEVAP (if HC), and the final emission factor. If the user selects only one pollutant to be calculated and printed (PRTFLG = 1 or 2 or 3), then only the selected pollutant's block of fields is printed.

The other two blocks remain blank. Below is a no-I/M HC-only run by-model-year output table example:

Light-Duty Gas Trucks 1
Jan 1, 1988

Model Year	TF	Miles	Base	HC Tampr	SALHCF	EVAP	Final
1988	.031	2174.	0.523	0.223	1.000	0.698	0.045
1987	.120	13006.	0.576	0.240	1.000	0.767	0.190
1986	.110	29456.	0.585	0.30	1.000	0.832	0.193
etc.							

Where: $[(\text{Base} + \text{Tampr}) * \text{SALHCF} + \text{Evap}] * \text{TF} = \text{Final}$

The method described above was implemented for MOBILE3. It has not yet been applied to MOBILE4, but the only problem anticipated is with the IBM PC/AT-compatible version. This version differs from the mainframe version in the reduction of the number of named elements (symbols such as subroutine and function names, variable and array names, and named common blocks). This reduction was required in order to meet a static numerical limit imposed by the IBM PC Microsoft FORTRAN Optimizing Compiler, Version 4.01. Adding new elements is not feasible with the PC version, unless a compiler without this constraint is used. (Note: The Apple Macintosh Absoft MacFortran/020 Compiler does not have this problem.)

3.3 MISCELLANEOUS MOBILE4 MODIFICATIONS

3.3.1 Purpose

This section discusses ways to take advantage of known local modeling conditions or system options to either simplify the use of MOBILE4, lower computer resource requirements, or both. The discussion assumes that the number of runs and scenarios planned warrant the effort to make these changes. This effort can be considerable. The user is advised to estimate the cost and time required before authorizing the changes.

3.3.2 Hardcoding Locality-Specific Data

Users who plan to run a very large number of MOBILE4 data sets, and who wish to override the MOBILE4 default conditions with their own locality-specific data in each data set, could consider modifying the BLOCK DATA initialization of arrays and variables to replace the MOBILE4 data with their own data.

3.3.3 Reducing Computer CPU Time Requirements

Select the highest level of optimization of the compiler that will still produce code that yields valid results. Validity is measured by matching results of Release MOBILE4 against those of the local version. (Note: Code compiled using the highest level of optimization (OPT=3) of IBM's *FORTRANVS compiler does not generate correct results.)

Computational code may be converted to assembly language mnemonics with an extended FORTRAN which permits an in-line assembly drop-in to be interspersed with the ordinary FORTRAN statements. Depending on the optimizing capabilities of the available FORTRAN compiler, this method can reduce run time by 10 to 50 percent.

The source code can remain FORTRAN and still be modified to decrease the execution time of the compiled code. One way is to reduce the overhead associated with subroutine calls. Delete routines which are called from only one or two places and move their logic into the calling routine. The pointer functions typically contain very few lines of code. The following steps place all the index look-up logic into the calling routines:

Move IGEPTR, IGUPTR, IGLPTR, and IGTPTTR into BIGALH.

Move IBFPTR into both BEGIN2 and BEFIDL.

Move IERPTR into BEF.

Move ISPPTR into both BIGCFX and BIGSAL.

Move EXMPTR and ITCPTR into BIGCFX.

Move IGSFPT into each of EFCALX, IDLCAL, HCCALX, and REGMOD.

Move ITAMPT into each of EFFGRP, EMIRAT, and EVPEME.

Move IEVPTR into both DIURNL and HOTSOK.

Move IGRVPT into RVPEXH.

Move IDLPTR into BEFIDL.

Move IMPTR into PCLEFT.

Move IRULPT into RULOSS.

3.3.4 Reducing Computer Memory Requirements

The easiest way to reduce the size of the compiled code is to select compiler options to that end. These choices may conflict with those made to speed up the execution of the runs. Also, in certain systems the user can direct the system to load code sections only when those sections are called (that is, on an as-needed basis), including and especially FORTRAN function libraries.

Otherwise, tailor the program to a specific usage, eliminating unneeded options and their associated input, processing, and output data structures and executable code. Note that changes to speed up the execution of the code may actually increase the size of the code, due to duplication of executable code. Examples of space reduction code revisions are provided below.

- (1) Eliminate an unnecessary region. Many of the arrays contain data for both low- and high-altitude regions. Users not requiring both regions could eliminate the "region" dimension of the arrays, delete the BLOCK DATA initializations of the undesired region, and make appropriate indexing changes.
- (2) Eliminate the inspection and maintenance (I/M) program features. Users who do not need to include I/M program effects in their analyses can delete BLOCK DATAs 6, 7, 8, and 9, the named I/M common blocks (names of the forms /ICRxxx/ or /IMxxxx/), and the modules GETIMP, GETIMC, and PCLEFT. Remove all references to the variables and arrays in those common blocks and to the I/M modules. Hardcode I/M- related flags and switches (such as IMFLAG and IM) to the no-I/M case value (usually 1).
- (3) Use halfword integer arrays and variables, when the halfword maximum integer value (32,767) exceeds the largest value to be assigned. All MOBILE4 arrays and variables currently meet this constraint. Conversion from full-word to halfword integers would save 10,624 bytes of memory space.

Chapter 4

MOBILE4 AND USER'S GUIDE ERRATA AND ADDENDA

4.0 INTRODUCTION

MOBILE4 was released on February 28, 1989. The User's Guide, the mainframe (9-track tape) version, and the PC (diskette) version of the model were all available through the National Technical Information Service (NTIS) by late March 1989.

A number of errors went undetected in the release of the model. In addition, several errors and misstatements were included in the release version of the User's Guide. This chapter documents those changes and corrections to both the program code and the User's Guide that had been detected and corrected as of May 19, 1989.

The reader is advised that all of these changes and corrections to the program code have been made to the MOBILE4 files residing in the Michigan Terminal System (MTS) at Wayne State University in Detroit, and in the National Computing Center (NCC) IBM computers, as of May 8, 1989. These corrections were submitted to NTIS on May 12, 1989, and all copies of the PC (diskette) version of the program or of the User's Guide obtained from NTIS after that date are current.

This chapter consists of four sections: The first discusses the changes and corrections to the MOBILE4 program code, the second details the actual coding changes that have been made to correct the program, the third discusses the errors and corrections to the User's Guide to MOBILE4, and finally there are a set of replacement pages for the User's Guide.

EPA, as noted above, has made all of these program corrections on the MOBILE4 program files on MTS-Wayne State and on the NCC-IBM system. In addition, corrected PC (diskette) versions of the program have been distributed to the EPA Regional Offices and to a number of parties that obtained MOBILE4 directly from the Ann Arbor Motor Vehicle Laboratory. Due to lack of demand, EPA did not distribute corrected copies of the mainframe (9-track tape) version of the program. Those users working with the mainframe version, and not working from MTS-Wayne State or NCC IBM, will have to implement the coding corrections (detailed in section 4.2) themselves. To assist in this process, the line numbers corresponding to the numbering used in Appendix C (Source Code Listing) are referenced, and the locations of the changes (which are included in the Appendix C source code listing) are indicated in Appendix C by vertical black bars in the left margin.

4.1 PROGRAM CHANGES AND CORRECTIONS

The changes and corrections discussed in this section are listed below:

(1) Corrections to the algorithm that determines the correction to exhaust emissions for the effects of fuel volatility (RVP), at temperatures of 40°F or less.

(2) Corrections to the algorithm that provides for exhaust emission credits (benefits) when fuel RVP is reduced to levels under 9.0 psi, under certain high-temperature conditions.

(3) A correction to the tampering rate tables contained in Block Data 25.

(4) Corrections to the algorithm that calculates idle carbon monoxide (CO) emission factors for certain vehicle types and model year groups.

(5) A correction to the algorithm that calculates hot soak evaporative emissions from motorcycles.

(6) Corrections to the RVP exhaust emission correction factors for bag 1 (cold-start) CO emissions.

For the first two items listed above, the following information is provided: A description of the problem, including background information, the intended functioning of the program, and the impact of the problem on the emission factor results; and guidance indicating how the problem can be avoided before the corrections are made.

For the third through sixth items listed, which are relatively minor in terms of both the coding changes required for correction and the impact on the emission factor results, the error and its impact on the results are described.

In section 4.2, the coding changes required for correction of each problem are detailed.

4.1.1 Exhaust emission corrections for fuel volatility at temperatures of 40°F or less

4.1.1.1 Description

MOBILE4 exhaust emission factors are corrected for fuel volatility as measured by Reid vapor pressure (RVP). Data from EPA's emission factor testing programs have shown that exhaust emissions vary with fuel volatility. In general, fuels of higher RVP lead to increases in exhaust HC, CO, and NOx, relative to emissions on 9.0 psi RVP (certification) fuel. (There is no volatility correction when RVP is 9.0 psi). The impact of volatility on exhaust emissions also varies with temperature, with the effect being larger at higher temperatures and smaller at lower temperatures. Below 40°F, no consistent effect of RVP on exhaust emissions was observed. Thus, in MOBILE4 no volatility correction to any exhaust emission factors is intended if the temperature is $\leq 40^\circ\text{F}$.

As described in sections 2.2.12 and 2.2.13 of the User's Guide, the user of the program is required to supply two RVP values as part of the input stream: a base RVP and an "in-use" RVP. The base RVP represents the currently prevailing volatility level, and the "in-use" RVP value represents the RVP of fuel after implementation of an in-use volatility control program. The user also supplies an in-use start year; the in-use RVP is then applied for any calendar year of evaluation equal to or after this start year.

As noted, EPA's emission factor program test data showed no consistent (and generally very small) effects of fuel RVP on exhaust emissions at temperatures of 40°F or less. Thus, it was determined that the RVP correction factor applied to exhaust emissions in MOBILE4 should be 1.0 (as a multiplicative factor, no correction) if the temperature applicable to exhaust emissions is $\leq 40^\circ\text{F}$.

The RVP effects on exhaust emissions differ by the model year (MY) of vehicle. In MOBILE4, distinct RVP corrections are applicable to exhaust emissions for three MY groups of light-duty gasoline-fueled vehicles (LDGVs): 1971-79, 1980-82, and 1983 and later. Two subroutines are used by MOBILE4 to determine these RVP corrections; one for the MY 1971-79 LDGVs and another for MY 1980-82 and MY 1983+ LDGVs.

For the latter two model year groups only, a test statement was inadvertently omitted from the MOBILE4 code that would

prevent calculation of RVP corrections to exhaust emissions if the applicable temperature was $\leq 40^{\circ}\text{F}$. This statement should have been of the general form:

**IF (THE TEMPERATURE IS 40°F OR LESS)
THEN (DO NOT CALCULATE AN RVP CORRECTION FOR EXHAUST EMISSIONS)**

As a result of such a test having been omitted from the MOBILE4 code as released, the possibility exists of a MOBILE4 user supplying input data that contains both temperature(s) $\leq 40^{\circ}\text{F}$ and an RVP value (either base or in-use) > 9.0 psi, and obtaining erroneous (underestimated) exhaust emission factors as a result.

4.1.1.2 Guidance

This situation can be avoided if the guidance on MOBILE4 input values provided below is followed:

"When MOBILE4 is used to estimate emission factors for situations where the temperature is at or below 40°F , 9.0 should be used as the value of both base and in-use RVP."

Phrased in a way more specifically directed to the MOBILE4 user preparing the input data for running the model, this guidance reads:

"If TEMFLG = 2 and the input ambient temperature is $\leq 40^{\circ}\text{F}$ (see sections 2.1.14 and 2.3.4 of the User's Guide), or if TEMFLG = 1 and the input minimum and maximum temperatures are such that $[\text{Min} + (2/3) * (\text{Max} - \text{Min})] \leq 40^{\circ}\text{F}$ (see sections 2.1.14 and 2.2.11 of the User's Guide), then the input values of both base and in-use RVP must be 9.0 psi."

Although fuel volatility tends to be higher in colder seasons, it was intended that MOBILE4 would show no effect of fuel RVP on exhaust emissions at temperatures at or below 40°F . Adherence to this guidance will ensure that the resulting emission factors behave as intended.

4.1.1.3 Program Changes

The programming changes necessary to prevent unintended emission factor results from being calculated even if the guidance above is not followed are detailed in section 4.2, "Program Code Corrections."

These changes were incorporated on the MOBILE4 tape and PC version diskettes that were submitted to the National Technical Information Service (NTIS) in March. These changes had also been made to installed MOBILE4 on the Michigan Terminal System (MTS) at Wayne State University and the NCC-IBM system as of March 30, 1989.

4.1.2 Corrections to algorithm providing for exhaust emission benefits due to RVP reductions to below 9.0 psi under certain high-temperature conditions

4.1.2.1 Description

EPA's certification of new vehicles is performed at a nominal temperature of 75°F, using fuel with volatility of 9.0 psi Reid vapor pressure (RVP). The evaporative emission control system, consisting primarily of a canister of activated carbon and related hoses and valves, is designed to be capable of capturing almost all hydrocarbon (HC) vapors generated under these conditions and routing them to the engine via canister purging to be burned, without adversely affecting exhaust emissions.

If temperatures are greater than 75°F, or if fuel RVP is greater than 9.0 psi, or both, then excess evaporative emissions (relative to the certification procedure) are generated. Some of these excess emissions are returned to the engine to be burned, and the engine is no longer able to handle the increased volume of purged vapor without adversely impacting exhaust emissions. This situation underlies the development and use of RVP correction factors to exhaust emissions in MOBILE4.

Viewing the same principles from a different perspective, it is also reasonable to assume that additional exhaust emission reductions may be obtained through the use of fuel with RVP less than that of certification fuel (9.0 psi), provided that the temperature is sufficiently greater than 75°F. This is because the generation of evaporative HC emissions will be greater than that experienced during vehicle certification if temperatures are high, even though the fuel RVP is the same. Thus, the vehicle engine/canister system is unable to handle the vapor generation and purge without adversely affecting exhaust emissions.

In release MOBILE4, an algorithm for modeling this was developed based on the ASTM volatility class input value. The problem that results from this approach is that using identical

input data, with the exception of the ASTM class designation, results in the calculation of exhaust emission factors that are different in Class A areas than in Class B areas, and both are different than those calculated for Class C areas. In reality, exhaust emission factors should be the same for any area, regardless of ASTM class, if the same temperatures, fuel volatilities, and other inputs are used.

4.1.2.2 Guidance

Until the program code corrections detailed below are implemented in the version of the model being used, users should specify ASTM Class C in the input stream, regardless of the actual ASTM class designation of the area being modeled. For RVP values of 9.0 psi or greater, the emission factors will be correct. The program code corrections must be implemented in order to estimate the impact on exhaust emission factors of RVP lower than 9.0 psi. This situation should arise only in conjunction with the modeling of an in-use fuel volatility control program in ASTM Class A or B areas, since current fuel volatility runs well over 9.0 psi in almost all areas of the country, and is unlikely to be below 9.0 psi in Class C areas even with volatility controls.

4.1.2.3 Program Changes

The corrections for this problem provided in section 4.2 serve two functions: (1) The same emission factors will be calculated for any area, regardless of ASTM class, if the same temperatures, volatilities, and other inputs are used, and (2) additional exhaust emission reductions will be modeled corresponding to the use of fuel with volatility under 9.0 psi RVP (to as low as 7.0 psi), provided that the temperature applicable to exhaust emissions is 95°F or higher.

4.1.3 Correction to tampering rate data in Block Data 25

4.1.3.1 Description

MOBILE4 models the impact on emission factors of a number of types of tampering, as discussed in section 2.2.1 of the User's Guide. On the basis of EPA's tampering surveys, rates of tampering are developed as linear functions of vehicle mileage (expressed in terms of a "zero-mile level" of tampering with a given component and a "deterioration rate," or rate of increase in the rate of tampering per 10,000 miles accumulated vehicle mileage).

The tampering rates built into MOBILE4 are a function of vehicle type, model year group, and the presence or absence of an operating inspection and maintenance (I/M) program. These rates are contained in the Block Data 25 subprogram of MOBILE4. An error in one of the zero-mile levels (total misfueling for light-duty gasoline-fueled vehicles of model year group 2, with I/M) has been detected. Failure to correct this erroneous data point will lead to slight underestimates of the LDGV emission factors. (The change is less than 1% for all pollutants and all calendar years.)

4.1.3.2 Program Changes

The necessary correction involves a single value that appears in the Block Data 25 subprogram, and is detailed in section 4.2.

4.1.4 Corrections to the calculation of idle carbon monoxide (CO) emission factors for certain vehicle types and model year groups

4.1.4.1 Description

The algorithm used to estimate idle emission factors in MOBILE4 is significantly different than that used in earlier versions of the model. The idle emissions are based on a curve fit to the idle and low-speed emission data, with all emissions expressed in terms of mass pollutant per unit time (grams per hour) rather than per unit distance (grams per mile). This approach is based on the idea that emissions per unit time at idle and at very low speeds should be closely related, on the basis of the work being demanded of the engine, and provides the advantage of allowing the idle emission factors to be corrected for a number of other variables (such as deterioration with accumulated mileage and the effects of I/M programs) in a manner consistent with the treatment of exhaust emissions.

An unexpected result of implementing this algorithm, in which idle emissions depend indirectly on the zero-mile levels and deterioration rates of the corresponding basic exhaust emission rate equations, is that "zero-mile" idle CO emissions for a few model years of light-duty gasoline-fueled vehicles (LDGVs) and trucks (LDGTs) are projected to be less than zero. The correction for this anomaly is based on the substitution of low-mileage average idle emissions data for the emissions projected from the speed-dependent curve, in those cases where

the curve-based estimates become negative. The impact on the fleetwide idle emission factors is very small. (At 78°F and 11.5 psi RVP fuel, the effect of implementing the correction is to increase the all-vehicle idle CO emission factor by 1.4%.)

4.1.4.2 Program Changes

The coding changes required are the revision of two existing lines and the insertion of 12 additional lines (which include comment lines describing the action of the executable statements). These are detailed in section 4.2.

4.1.5 Correction to the calculation of motorcycle hot soak evaporative emissions

4.1.5.1 Description

There is a minor error in the MOBILE4 "Function HOTSOK" subprogram that affects the calculation of hot soak evaporative emissions from motorcycles (MCs). This error involves the fraction of MCs that are assumed to be driven at least once per day, and thus to generate hot soak emissions. The released program slightly underestimates MC evaporative emissions. (After the corrections, MC evaporative emissions are about 15% higher and MC total non-methane hydrocarbon (NMHC) emissions are about 8% higher; the corresponding all-vehicle NMHC emission increases are less than 1% (evaporative) and about 0.1% (total).)

4.1.5.2 Program Changes

Two changes should be made to the program code, one to a comment line and one to an executable statement. These lines, as released and with the corrections, are presented in the next section.

4.1.6 Corrections to the RVP exhaust emission correction factor calculation for bag 1 (cold-start) CO emissions

4.1.6.1 Description

The fuel volatility (RVP) correction factors for exhaust emissions depend on vehicle type, model year, pollutant, and "bag" (operating mode). In release MOBILE4, the RVP correction factor for bag 1 (cold-start) carbon monoxide (CO) emissions is

calculated, but is never applied to the emission factor. The effect of this problem is that exhaust CO emission factors are slightly underestimated for cases where fuel RVP is greater than 9.0 psi and the temperature is greater than 40°F. (The exhaust CO emission factors will be less than 1% higher, assuming standard operating mode fractions.)

4.1.6.2 Program Changes

Four revisions to the code are required, three to executable statements and one to a comment line. These changes occur in the subprograms "Subroutine BIGTCF" and "Subroutine BIGOMT," and are detailed in section 4.2.

4.2 PROGRAM CODE CORRECTIONS

The program code corrections for the six problem areas discussed in the previous section are detailed below. The section numbering corresponds to that of the previous section (i.e., the code corrections for the problem discussed in sections 4.1.1, 4.1.2, and so on are detailed under sections 4.2.1, 4.2.2, and so on).

An indexing line, with an asterisk (*) in column 7 where executable statements must begin and counter marks (1,2,...,8) indicating the positions of columns 10, 20, ..., 80, is included above each block of code presented.

As noted, all of these corrections have been made to MOBILE4 on MTS at Wayne State University and on the NCC IBM. The source code listing in Appendix C reflects all of these corrections. The changes relative to release MOBILE4 are indicated in Appendix C by a vertical black bar to the left of all newly inserted or revised lines of code, with the deletion of lines indicated by an arrowhead in the left margin. The line numbers referred to are those shown in Appendix C.

4.2.2 Corrections to algorithm providing for exhaust emission benefits due to RVP reductions to below 9.0 psi under certain high-temperature conditions

There are a total of 21 lines of code that must be revised (altered, deleted, or added). The changes occur in six different modules of MOBILE4, and are presented below by module affected.

4.2.2.1 Changes to Subroutine LOCAL. See pages C-88 and C-90.

4.2.2.1.1 Delete one line between lines 126035 and 126036. The line to be deleted reads:

```

      * 1          2          3          4          5          6          7          8
C  ADJRVP  R      RVP adjustment for ASTM class for RVPs for exhaust RVP cf calc.

```

4.2.2.1.2 Alter line 126136. In release MOBILE4, the line reads:

```

      * 1          2          3          4          5          6          7          8
C  hot soak RVPs, except for an ASTM Class adjustment for classes A & B.

```

The corrected line reads:

```

      * 1          2          3          4          5          6          7          8
C  hot soak RVPs.

```

4.2.2.1.3 Delete two lines between lines 126137 and 126138. The lines to be deleted read:

```

      * 1          2          3          4          5          6          7          8
      IF(ICLASS.LE.2) ADJRVP=ASTRUB(3)/ASTRUB(ICLASS)
      IF(ICLASS.GT.2) ADJRVP=1.0

```

4.2.2.1.4 Alter line 126140. In release MOBILE4, the line reads:

```

      * 1          2          3          4          5          6          7          8
      RVPX(ICER,IFUEL)=ADJRVP*RVPHS(ICER,IFUEL)

```

The corrected line reads:

```

      * 1          2          3          4          5          6          7          8
      RVPX(ICER,IFUEL)=RVPHS(ICER,IFUEL)

```

4.2.2.2 Changes to Subroutine CALTEM. See pages C-91 and C-92.

4.2.2.2.1 Delete two lines between lines 127028 and 127029. The lines to be deleted read:

	* 1	2	3	4	5	6	7	8
C	ADJTEM	I	ASTM adjustment to exhaust temperature for RVP exhaust cf calc.					
C	ASTTUB	I	ASTM Classes A & B adjustments to exhaust temperature.					

4.2.2.2.2 Delete four lines between lines 127039 and 127040. The lines to be deleted read:

```

      * 1      2      3      4      5      6      7      8
      DIMENSION ASTTUB(2)

C
      DATA ASTTUB/14.0,7.0/

C

```

4.2.2.2.3 Alter line 127103. In release MOBILE4, the line reads:

* 1 2 3 4 5 6 7 8
C TCF temperatures, except for an ASTM Class adjustment for classes A & B.

The corrected line reads:

	* 1	2	3	4	5	6	7	8
C	exhaust	TCF	temperatures.					

4.2.2.2.4 Delete two lines between lines 127104 and 127105. The lines to be deleted read:

#	1	2	3	4	5	6	7	8
	IF(ICLASS.LE.2)	ADJTEM=ASTTUB(ICLASS)						
	IF(ICLASS.GT.2)	ADJTEM=0.0						

4.2.2.2.5 Alter line 127106. In release MOBILE4, the line reads:

*	1	2	3	4	5	6	7	8
	TEMAST(IP)=TEMEXH(IP)-ADJTEM							

The corrected line reads:

*	1	2	3	4	5	6	7	8
	TEMAST(IP)=TEMEXH(IP)							

4.2.2.3 Change to Subroutine EFCALX. See page C-109.

Alter line 201092. In release MOBILE4, the line reads:

*	1	2	3	4	5	6	7	8
	IF(FRETH.GT.0.0) CALL RVPEXH(ICY,2,RVPX(2,1),RVPX(2,2))							

The corrected line, with the change underlined for emphasis, reads:

*	1	2	3	4	5	6	7	8
	IF(FRETH.GT.0.0) CALL RVPEXH(ICY,2,RVPX(<u>1,2</u>),RVPX(2,2))							

4.2.2.4 Changes to Subroutine BIGRVP. See page C-170.

4.2.2.4.1 Alter line 227071. In release MOBILE4, the line reads:

*	1	2	3	4	5	6	7	8
	RDIFA=AMAX1(RDIFA,0.0)							

The corrected line, with the changes underlined for emphasis, reads:

*	1	2	3	4	5	6	7	8
	<u>IF(TEMEXH(IP).GE.95.0)</u> RDIFA=AMAX1(RDIFA, <u>-2.0</u>)							

4.2.2.4.2 Insert a new line 227072, immediately following line 227071 (shown in 4.2.2.4.1 above). The new line reads:

*	1	2	3	4	5	6	7	8
	IF(TEMEXH(IP).LT.95.0) RDIFA=AMAX1(RDIFA, 0.0)							

4.2.2.5 Changes to Block Data Subprogram 17. See page C-361.

4.2.2.5.1 Reverse the order of lines 517080 and 517081. In release MOBILE4, the lines read:

	*	1		2		3		4		5		6		7		8
C	TEMAST	R		TEMEXH		adjusted		for		ASTM		class		for		RVP
C						exhaust		cf		calculation.						
						and		running		loss.						

The corrected lines read:

	*	1		2		3		4		5		6		7		8
C						and		running		loss.						
C	TEMAST	R		TEMEXH		adjusted		for		ASTM		class		for		RVP
						exhaust		cf		calculation.						

4.2.2.5.2 Alter line 517081. The line reads (after the change immediately above has been made):

	*	1		2		3		4		5		6		7		8
C	TEMAST	R		TEMEXH		adjusted		for		ASTM		class		for		RVP
						exhaust		cf		calculation.						

The corrected line, with the changes underlined for emphasis, reads:

	*	1		2		3		4		5		6		7		8
C	TEMAST	R		=		TEMEXH.		Used		for		RVP		exhaust		cf
						calculation.										

4.2.2.6 Changes to Block Data Subprogram 30. See page C-419.

4.2.2.6.1 Alter line 530082. In release MOBILE4, the line reads:

	*	1		2		3		4		5		6		7		8
C						RVPX		differs		from		the		evaporative		RVPs
						(RVPHS/ET1&2)		by		an						

The corrected line, with the changes underlined for emphasis, reads:

	*	1		2		3		4		5		6		7		8
C						RVPX		<u>now equals the corresponding</u>		<u>evaporative</u>		<u>RVPHS/ET1&2.</u>				

4.2.2.6.2 Delete one line between lines 530082 and 530083. The line to be deleted reads:

	*	1		2		3		4		5		6		7		8
C						ASTM		Class		adjustment		(		* 11.5/(9.0 if A or 10.0 if B)		).

4.2.3 Correction to tampering rate data in Block Data 25

Only one line must be revised to correct this error. See page C-404.

Alter line 525716. The line in release MOBILE4, including several preceding lines to assist in locating the line requiring correction, reads:

	* 1	2	3	4	5	6	7	8
	DATA TAMZML/							
C	AIRS	CATS	NCKS	TNKS	EGRS	EVAP	PCVS	CAPS MISF
.								
.								
.								
C	I/M & MYG 2							
	1	-.0106, -.0058, -.0002, .0115, .0002, -.0063, -.0024, -.0077, .0013,						

The correction is to the final value of the last line listed above. The corrected line, with the change underlined, reads:

	* 1	2	3	4	5	6	7	8
	1	-.0106, -.0058, -.0002, .0115, .0002, -.0063, -.0024, -.0077, <u>.0113,</u>						

4.2.4 Corrections to the calculation of idle carbon monoxide (CO) emission factors for certain vehicle types and model year groups

One revision and 12 new lines are required in the Function BEFIDL subprogram, and one revision is required to the Block Data 05 subprogram.

4.2.4.1 Changes to Function BEFIDL. See pages C-224, C-225, and C-227.

4.2.4.1.1 Insert a new line 250029. The lines immediately preceding and following the new line are shown to assist in proper location of the insert.

	* 1	2	3	4	5	6	7	8
C	CHGHR5(4)	-	CHGHR5 (IVREV)					
C	COLIM(14)	-	COLIM (IGUTIO)					
C	D50 (3)	-	D50 (I23F)					

4.2.4.1.2 Insert a new line 250044. The lines immediately preceding and following the new line are shown to assist in proper location of the insert.

	* 1	2	3	4	5	6	7	8
C		scaled by 10**-4						
C	COLIM	R	CO idle EF LBs for each IGUTIO MYG; keeps low vmt cases >0.0					
C	D50	R	BF deterioration rate for beyond 50K miles					

4.2.4.1.3 Alter line 250086. In release MOBILE4, the line reads:

1	2	3	4	5	6	7	8
DIMENSION IDLREV(4),DBF(3),ZBF(3),D50(3),CHGHR(4)							

The corrected line, with the changes underlined for emphasis, reads:

* 1	2	3	4	5	6	7	8
DIMENSION IDLREV(4),DBF(3),ZBF(3),D50(3),CHGHS(4),COLIM(14)							

4.2.4.1.4 Insert 2 new lines 250091 and 250092. The lines immediately preceding and following the new lines are shown to assist in proper location of the insert.

* 1	2	3	4	5	6	7	8
DATA MTHIDL/0.9,1.5/,CHGHR/19.6,19.6,19.6,20.0/							
DATA COLIM/303.37,56.71,22.56,25.63,35.17,30.36,31.77,							
* 26.23,25.08,24.07,23.71,23.24,22.38,21.78/							

C

4.2.4.1.5 Insert 8 new lines 250021 through 250028. The lines immediately preceding and following the new lines are shown to assist in proper location of the insert.

* 1	2	3	4	5	6	7	8
BEFIDL=BEFIDL+UTIDOF(IGUTIO,IP,IVVT)							

C

C If LDGV, raise low vmt CO cases (which can go negative by using the curve)
C to an average (by the low end data) value.

C

```
IF(IV.EQ.1.AND.IP.EQ.2.AND.IREJN.EQ.1)
*   BEFIDL=AMAX1(BEFIDL,COLIM(IGUTIO))
IF(IV.EQ.1.AND.IP.EQ.2.AND.IREJN.EQ.2)
*   BEFIDL=AMAX1(BEFIDL,COLIM(IGUTIO)*1.17)
```

C

4.2.4.2 Change to the Block Data Subprogram 05. See page C-315.

Alter line 505491. In release MOBILE4, the line reads:

	*	1	2	3	4	5	6	7	8
C		-26.10,	-46.22,	-50.74,	-51.37,	-52.06,	-52.13,	-54.77,	

The corrected line, with the changes underlined for emphasis, reads:

	*	1	2	3	4	5	6	7	8
C		<u>-23.11,</u>	<u>-22.21,</u>	-50.74,	-51.37,	-52.06,	-52.13,	-54.77,	

4.2.5 Correction to calculation of motorcycle hot soak evaporative emissions

Two lines must be revised in the Function HOTSOK subprogram. See page C-191.

Alter lines 234177 and 234180. In release MOBILE4, the lines (with several additional lines presented to assist in locating the subject lines) read:

	*	1	2	3	4	5	6	7	8
C		Multiply	fleet	value	by	the	fraction	of	vehicles
C		HDGV	daily	trip	fraction	is	1.0,	all	other
C									vehicles
									use
									0.761.
		TRIPFR=0.761							
		IF (IVGAS.EQ.4)	TRIPFR=1.0						

The corrected lines, with the changes underlined for emphasis, read:

	*	1	2	3	4	5	6	7	8
C		Multiply	fleet	value	by	the	fraction	of	vehicles
C		HDGV	<u>and</u>	<u>MC</u>	daily	trip	fraction	is	1.0,
C									all
									other
									vehicles
									use
									0.761.
		TRIPFR=0.761							
		IF (IVGAS. <u>GE</u> .4)	TRIPFR=1.0						

4.2.6 Corrections to the RVP exhaust emission correction factor calculation for bag 1 (cold-start) CO emissions

There are four lines of code that must be revised:

4.2.6.1 Changes to Subroutine BIGTCF. See page C-168.

4.2.6.1.1 Alter line 226118. In release MOBILE4, the line reads:

```
* 1      2      3      4      5      6      7      8
DO 45 IB=1,3
```

The corrected line, with the change underlined for emphasis, reads:

```
* 1      2      3      4      5      6      7      8
DO 45 IB=LOWCO,3
```

4.2.6.1.2 Alter line 226136. In release MOBILE4, the line reads:

```
* 1      2      3      4      5      6      7      8
DO 60 IB=1,3
```

The corrected line, with the changes underlined for emphasis, reads:

```
* 1      2      3      4      5      6      7      8
DO 60 IB=LOWCO,3
```

4.2.6.2 Changes to Subroutine BIGOMT. See page C-179.

4.2.6.2.1 Alter line 231062. In release MOBILE4, the line reads:

```
* 1      2      3      4      5      6      7      8
C So if cold start & low temp CO case, correct only for operating mode here.
```

The corrected line, with the changes underlined for emphasis, reads:

```
* 1      2      3      4      5      6      7      8
C So if cold start & low temp CO case, correct only for operating mode & RVP.
```

4.2.6.2.2 Alter line 231068. In release MOBILE4, the line reads:

```
* 1      2      3      4      5      6      7      8
IF(IB.GT.1.OR.LOWCO.NE.2) OMT=OMT*TCF(IB)
```

The corrected line reads:

```
* 1      2      3      4      5      6      7      8
OMT=OMT*TCF(IB)
```

4.3 USER'S GUIDE CORRECTIONS

There are five corrections to the User's Guide to MOBILE4 discussed below. In addition, the program corrections detailed above in some cases affected the emission factor results for the example MOBILE4 runs shown in Chapter 5 of the User's Guide. Corrected example run outputs are provided here, in a form compatible with the distributed copies of the User's Guide.

4.3.1 In section 2.2.1.4, page 2-17, the order of tampering types is listed for the case where the user elects to provide alternate tampering rates as input to the model. Two of the types are listed in reversed order, which will result in erroneous emission factors for gasoline-fueled vehicle types if not corrected. The correct order, with the changes indicated by asterisks (*), is:

- 1) air pump disablement
- 2) catalyst removal
- * 3) fuel inlet restrictor disablement
- * 4) overall misfueling
- 5) EGR system disablement
- 6) evaporative control system disablement
- 7) PCV system disablement
- 8) missing gas caps

4.3.2 Also in section 2.2.1.4 (page 2-17), the description of the order of the records required for input of alternate tampering rates is incorrect and incomplete. All zero-mile levels (pre-1981 and 1981+) precede all deterioration rates, with each of the records appearing for four vehicle types (LDGV, LDGT1, LDGT2, HDGV) for either the non-I/M case only or both the non-I/M and I/M cases. A corrected summary of the input appears below:

Non-I/M Case Records	Non-I/M and I/M Records	Description	Format
(1- 4)	(1- 4)	ZML for pre-1981 MY vehicles (non-I/M)	8F8.4
(5- 8)	(5- 8)	ZML for 1981+ MY vehicles (non-I/M)	8F8.4
	(9-12)	ZML for pre-1981 MY vehicles (I/M)	8F8.4
	(13-16)	ZML for 1981+ MY vehicles (I/M)	8F8.4
(9-12)	(17-20)	DR for pre-1981 MY vehicles (non-I/M)	8F9.5
(13-16)	(21-24)	DR1 for 1981+ MY vehicles (non-I/M)	8F9.5
(17-20)	(25-28)	DR2 for 1981+ MY vehicles (non-I/M)	8F9.5
	(29-32)	DR for pre-1981 MY vehicles (I/M)	8F9.5
	(33-36)	DR1 for 1981+ MY vehicles (I/M)	8F9.5
	(37-40)	DR2 for 1981+ MY vehicles (I/M)	8F9.5

These are the only two User's Guide corrections that may directly impact user preparation of the input data stream for MOBILE4. A revised copy of page 2-17 of the User's Guide reflecting these corrections is included in section 4.4.

4.3.3 In section 2.2.3.4, page 2-20, the last sentence of the second paragraph should read "These values are input as miles divided by 100,000 (e.g., 12,637 miles is input as 0.12637)."

4.3.4 In section 2.2.10.3, page 2-29, the correspondence of ASTM volatility class designations (A, B, C, D, E) to fuel RVP limits contains an error. The ASTM Class B volatility limit is 10.0 (not 10.5) psi. The correct limits are used in the MOBILE4 program code.

4.3.5 In section 2.3.3.1, page 2-36, the following erroneous statement is made: "In general, HC and CO emissions are at a minimum at the average speed of the Federal Test Procedure (FTP) used for new vehicle certification, or 19.6 mph, with emissions increasing as average speeds move further from that value (either higher or lower)." In fact, the statement should read "HC and CO emissions are generally higher than FTP levels at speeds below 19.6 mph, and generally lower than FTP levels at speeds above 19.6 mph."

4.3.6 The title of Chapter 3, on page 3-1, should read "MOBILE4 Outputs".

4.4 CORRECTED USER'S GUIDE PAGES

A set of replacement pages for insertion to existing copies of the User's Guide to MOBILE4 follow. These pages are numbered in the same way as the originally released User's Guide pages, and can simply be inserted in existing copies of the User's Guide as replacements for the existing pages having the same numbers. A list of the replacement pages included:

<u>Pages</u>	<u>Why included</u>
2-17 and 2-18	Page 2-17 revised to reflect the corrections described in section 4.3.1 and 4.3.2.
5-3 thru 5-14	Corrected examples 1a, 1b, 1c, and 1d.
5-17 thru 5-20	Corrected example 2.
5-23 thru 5-26	Corrected example 3.
5-29 thru 5-31	Corrected example 4.

2.2.1.5 Guidance

For guidance regarding EPA approval of tampering surveys and the development of tampering rates based on such surveys, contact the Office of Mobile Sources (Field Operations and Support Division, 202/382-2633 or FTS 382-2633).

2.2.2 VEHICLE MILES TRAVELLED MIX by vehicle type

2.2.2.1 Description

The vehicle miles travelled (VMT) mix specifies the fraction of total highway VMT that is accumulated by each of the eight regulated vehicle types. The VMT mix is used by MOBILE4 only to calculate the composite (all vehicle, or fleetwide) emission factor for a given scenario from the eight vehicle-class-specific emission factors.

2.2.2.2 Options

You can choose between the use of the MOBILE4 national VMT mix (VMFLAG = 1), the input of one locality-specific VMT mix for use in all scenarios of a given MOBILE4 run (VMFLAG = 3), or the input of a distinct locality-specific VMT mix for each scenario (VMFLAG = 2).

For inventory construction purposes, EPA generally will requires states to develop and use their own specific estimates of VMT by vehicle type. In such cases, VMT fractions based on those estimates of VMT by vehicle type should be calculated and used here as input.

2.2.2.3 MOBILE4 VMT Mix

MOBILE4 calculates the VMT mix based on national data characterizing registration distributions and annual mileage accumulation rates by age for each vehicle type, diesel sales fractions by model year (for LDVs and LDTs only), total HDDV registrations and annual mileage accumulations by weight class, and total vehicle counts (fleet size) by vehicle type. Considering the dependance of the VMT mix on the annual mileage accumulation rates and registration distributions by age (see section 1.3), the use of the MOBILE4 VMT mix is generally recommended in cases where the focus is on direct comparison of emission factors under different assumptions.

As noted above, for inventory construction states will generally develop and apply their own estimates of VMT by vehicle type. The use of an alternate VMT mix will result in minor internal inconsistencies; for example, assumptions concerning the

2.2.1.4 Required Information

The following information is required for input of alternate tampering rates: For each combination of vehicle type, pre-1981 or 1981 and later model year (MY), tampering type, and non-I/M or I/M case, you must supply a zero-mile level (ZML; y-intercept) and deterioration rate (DR; slope, or rate of increase in the tampering rate per 10,000 miles accumulated mileage). For 1981 and later MY vehicles, a second DR is also required, defining the rate of increase in the tampering rates after 50,000 miles accumulated mileage. All values must be in fractional units.

The order of the tampering types within each record is:

- (1) air pump disablement
- (2) catalyst removal
- (3) fuel inlet restrictor disablement
- (4) overall misfueling
- (5) EGR system disablement
- (6) evaporative control system disablement
- (7) PCV system disablement
- (8) missing gas caps.

A complete set of alternate tampering rate data inputs for the non-I/M case consists of a total of 20 records, and a complete set of inputs for both the non-I/M and I/M cases (required if IMFLAG=2) consists of 40 records. There are five records for each of the four gasoline-fueled vehicle types for each case (non-I/M, I/M). The five records required for each vehicle type are listed below. Each of the records listed occurs four times (once each for LDGVs, LDGT1s, LDGT2s, and HDGVs, in that order).

Non-I/M Case Records	Non-I/M and I/M Records	Description	Format
(1- 4)	(1- 4)	ZML for pre-1981 MY vehicles (non-I/M)	8F8.4
(5- 8)	(5- 8)	ZML for 1981+ MY vehicles (non-I/M)	8F8.4
	(9-12)	ZML for pre-1981 MY vehicles (I/M)	8F8.4
	(13-16)	ZML for 1981+ MY vehicles (I/M)	8F8.4
(9-12)	(17-20)	DR for pre-1981 MY vehicles (non-I/M)	8F9.5
(13-16)	(21-24)	DR1 for 1981+ MY vehicles (non-I/M)	8F9.5
(17-20)	(25-28)	DR2 for 1981+ MY vehicles (non-I/M)	8F9.5
	(29-32)	DR for pre-1981 MY vehicles (I/M)	8F9.5
	(33-36)	DR1 for 1981+ MY vehicles (I/M)	8F9.5
	(37-40)	DR2 for 1981+ MY vehicles (I/M)	8F9.5

where DR1 are applied up to 50,000 mi accumulated mileage and DR2 are applied after 50,000 mi accumulated mileage. (Data currently support the use of different values for DR1 and DR2 only for LDGVs; however, MOBILE4 is structured for input of two DRs for all 1981 and later MY gasoline-fueled vehicle types. For vehicle types other than LDGVs, DR1 and DR2 are assumed to be equal, and the same value should be input by the user for each of them.)

```

1 PROMPT - vertical flag input, no prompting
2 MOBILE4 Example 1a: OUTFMT = 1 (long (220 column) numeric output format)
3 TAMFLG - default tapering rates
4 SPDFLG - one speed per scenario for all IV
5 VMFLAG - default vmt mix
6 MYMRFGL - default registration and mileage accrual rates
7 INWFLG - default exhaust emission rates
8 IMFLAG - no I/M program
9 ALHFLG - no additional correction factor inputs
10 ATPFLG - no anti-tapering program
11 RLFLAG - uncontrolled refueling losses
12 LOCLFLG - read in local area parameters as 2nd req sc rec
13 TEMFLG - calculate exhaust temperatures
14 PRTEFLG - long 220 column numeric output format
15 OUTFMT - print exhaust HC, CO and NOx emission factor results
16 IDLFLG - do not print idle emissions results
17 NMHFLG - print NMHC
18 HCFLAG - print HC components
19 1 80 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN, ICV, SPD(1), AMBT, PCCN, PCMC, PCCC
20 Ann Arbor MI C 60, 84, 11.5 11.5 20 LAP rec: SCNAME, RVPAST, TEMMIN, TEMAX, RVPBAS, RVPBUS, RVPBUS, IUSES
21 1 85 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN, ICV, SPD(1), AMBT, PCCN, PCMC, PCCC
22 Ann Arbor MI C 60, 84, 11.5 11.5 20 LAP rec: SCNAME, RVPAST, TEMMIN, TEMAX, RVPBAS, RVPBUS, RVPBUS, IUSES
23 1 90 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN, ICV, SPD(1), AMBT, PCCN, PCMC, PCCC
24 Ann Arbor MI C 60, 84, 11.5 11.5 20 LAP rec: SCNAME, RVPAST, TEMMIN, TEMAX, RVPBAS, RVPBUS, RVPBUS, IUSES
25 1 95 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN, ICV, SPD(1), AMBT, PCCN, PCMC, PCCC
26 Ann Arbor MI C 60, 84, 11.5 11.5 20 LAP rec: SCNAME, RVPAST, TEMMIN, TEMAX, RVPBAS, RVPBUS, RVPBUS, IUSES
27 1 00 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN, ICV, SPD(1), AMBT, PCCN, PCMC, PCCC
28 Ann Arbor MI C 60, 84, 11.5 11.5 20 LAP rec: SCNAME, RVPAST, TEMMIN, TEMAX, RVPBAS, RVPBUS, RVPBUS, IUSES
29 Ann Arbor MI C 60, 84, 11.5 11.5 20

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1  PROMPT - vertical flag input, no prompting
1  MOBILE4 Example 1b: OUTFMT = 2 (short 139 column) numeric output format)
1  TAMPLG - default tampering rates
1  SPDPLG - one speed per scenario for all IV
1  VMPLG - default vat mix
1  MYMRFG - default registration and mileage accrual rates
1  NEWPLG - default exhaust emission rates
1  IMPLG - no I/M program
1  ALHPLG - no additional correction factor inputs
1  ATPPLG - no anti-tampering program
1  RLPLG - uncontrolled refueling losses
1  LOCPLG - read in local area parameters as 2nd req sc rec
1  TEMPLG - calculate exhaust temperatures
1  OUTFMT - short 139 column numeric output format
2  PRIFLG - print exhaust HC, CO and NOx emission factor results
4  IDLPLG - do not print idle emissions results
1  NMHPLG - print NMHC
2  HCFLAG - print HC components
1  80 19.6 75.0 20.6 27.3 20.6      1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCNC,PCCC
Ann Arbor MI C 60. 84. 11.5 11.5 20      LAP rec: SCNAME,RVPAST,TEMMIN,TEMMA,RVPBAS,RVPIUS,IUSESY
1  90 19.6 75.0 20.6 27.3 20.6      1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCNC,PCCC
Ann Arbor MI C 60. 84. 11.5 11.5 20      LAP rec: SCNAME,RVPAST,TEMMIN,TEMMA,RVPBAS,RVPIUS,IUSESY
1  00 19.6 75.0 20.6 27.3 20.6      1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCNC,PCCC
Ann Arbor MI C 60. 84. 11.5 11.5 20      LAP rec: SCNAME,RVPAST,TEMMIN,TEMMA,RVPBAS,RVPIUS,IUSESY

```


MOBILE4 Example 1b: OUTFMT = 2 (short (139 column) numeric output format)

R	Q	CY	Temp	Amb.	Cold/Hot	Start	P	1	LDGV	LDGT1	LDGT2	Composite Emission Factors				HDDV	MC	AllVeh
												LDGT	HQGV	LDDV	LDOT			
1	80	78	20.6	27.3	20.6	1			8.97	9.31	13.66	11.04	20.12	0.61	0.95	4.92	0.86	9.34
						X			4.29	4.78	6.96	5.65	10.16	0.61	0.95	4.92	6.57	4.70
						V			2.36	2.13	4.01	2.88	6.78				2.29	2.41
						R			0.41	0.48	0.48	0.48	0.82					0.41
						T			1.91	1.91	2.20	2.03	2.36					1.82
1	80	78	20.6	27.3	20.6	2			56.88	62.06	75.78	67.50	186.46	1.50	2.12	15.55	33.63	58.63
1	80	78	20.6	27.3	20.6	3			3.05	3.31	4.61	3.83	6.75	1.50	1.95	28.91	0.47	4.40
1	90	78	20.6	27.3	20.6	1			4.39	4.64	5.17	4.86	8.95	0.60	0.72	2.51	5.31	4.43
						X			1.94	2.67	2.78	2.71	3.48	0.60	0.72	2.51	2.33	2.13
						V			0.92	0.87	1.27	1.03	2.88				2.98	0.95
						R			0.28	0.35	0.35	0.35	0.60				0.28	
						T			1.25	0.75	0.77	0.76	1.80				1.07	
1	90	78	20.6	27.3	20.6	2			25.95	34.85	35.59	35.15	69.84	1.56	1.67	12.29	21.95	27.65
1	90	78	20.6	27.3	20.6	3			1.59	1.97	2.09	2.02	5.42	1.45	1.55	18.53	0.82	2.31
1	0	78	20.6	27.3	20.6	1			2.97	3.04	3.11	3.07	6.30	0.46	0.63	2.05	4.86	2.91
						X			1.06	1.63	1.70	1.66	2.42	0.46	0.63	2.05	1.86	1.21
						V			0.58	0.57	0.55	0.56	1.70				3.00	0.57
						R			0.25	0.33	0.33	0.33	0.54				0.24	
						T			1.09	0.52	0.53	0.53	1.64				0.88	
1	0	78	20.6	27.3	20.6	2			16.14	22.85	23.82	23.26	37.43	1.39	1.55	10.88	21.44	17.03
1	0	78	20.6	27.3	20.6	3			1.07	1.48	1.47	1.47	4.30	1.07	1.21	8.72	0.83	1.42

Vehicle Mix

LDGV	LDGT1	LDGT2	HQGV	LDDV	LDOT	HDDV	MC
.708	.129	.085	.015	.006	.001	.045	.010

.708	.129	.085	.015	.006	.001	.045	.010
.708	.129	.085	.015	.006	.001	.045	.010
.710	.127	.086	.015	.013	.004	.034	.010

.710	.127	.086	.015	.013	.004	.034	.010
.710	.127	.086	.015	.013	.004	.034	.010
.693	.116	.085	.015	.035	.017	.029	.010

.693	.116	.085	.015	.035	.017	.029	.010
.693	.116	.085	.015	.035	.017	.029	.010

```

1 PROMPT - vertical flag input, no prompting
MOBILE4 Example 1c: OUTFMT = 3 (landscape (112 column) descriptive output)
1 TAMFLG - default tapering rates
1 SPDFLG - one speed per scenario for all IV
1 VMFLAG - default vmt mix
1 VMRRFG - default registration and mileage accrual rates
1 NEMFLG - default exhaust emission rates
1 IMFLAG - no I/M program
1 ALMFLG - no additional correction factor inputs
1 ATPFLG - no anti-tapering program
1 RLFLAG - uncontrolled refueling losses
1 LOCFLG - read in local area parameters as 2nd req sc rec
1 TEMFLG - calculate exhaust temperatures
3 OUTFMT - MOBILE4 112 column descriptive output format
4 PRIFLG - print exhaust HC, CO and NOx emission factor results
1 IDLFLG - do not print idle emissions results
2 NMHFLG - print NMHC
2 HCFLAG - print HC components
1 80 19.6 75.0 20.6 27.3 20.6
Ann Arbor MI C 60. 84. 11.5 11.5 20
1 90 19.6 75.0 20.6 27.3 20.6
Ann Arbor MI C 60. 84. 11.5 11.5 20
1 00 19.6 75.0 20.6 27.3 20.6
Ann Arbor MI C 60. 84. 11.5 11.5 20

1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCHC,PCCC
LAP rec: SCNAME,RVPAST,TEMMIN,TEMMAK,RVPBAS,RVPIUS,IUSESY
1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCHC,PCCC
LAP rec: SCNAME,RVPAST,TEMMIN,TEMMAK,RVPBAS,RVPIUS,IUSESY
1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCHC,PCCC
LAP rec: SCNAME,RVPAST,TEMMIN,TEMMAK,RVPBAS,RVPIUS,IUSESY

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MOBILE4 Example 1c: OUTFMT = 3 (landscape (112 column) descriptive output)
 Non-methane HC emission factors include evaporative HC emission factors.

Cal. Year: 1980	I/M Program: No		Anti-tam. Program: No		Ambient Temp: 78.1 / 78.1 / 78.1 (F) Region: Low		Operating Mode: 20.6 / 27.3 / 20.6		Altitude: 500. Ft.			
Ann Arbor	MI	ASTM Class: C		Minimum Temp: 60. (F)		Maximum Temp: 84. (F)						
Base RVP: 11.5	In-use RVP: 11.5		In-use Start Yr: 2020									
Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HQGV	LDQV	LDQV	LDQV	LDQV	LDQV	LDQV	All Veh
Veh. Speeds:	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	
VMT Mix:	0.706	0.129	0.085		0.015	0.006	0.001	0.045	0.010	0.010	0.010	
Composite Emission Factors (Gm/Mile)												
Non-Meth HC:	8.97	9.31	13.66	11.04	20.12	0.61	0.95	4.92	8.86	9.337		
Exhaust HC:	4.29	4.78	6.96	5.65	10.16	0.61	0.95	4.92	6.57	4.697		
Evaporat HC:	2.36	2.13	4.01	2.88	6.78				2.29	2.412		
Refuel L HC:	0.41	0.48	0.48	0.48	0.82					0.407		
Running L HC:	1.91	1.91	2.20	2.03	2.36					1.621		
Exhaust CO:	56.88	62.06	75.78	67.50	186.46	1.50	2.12	15.55	33.63	58.632		
Exhaust NOx:	3.05	3.31	4.61	3.83	6.75	1.50	1.95	28.91	0.47	4.396		

Cal. Year: 1990	I/M Program: No		Ambient Temp: 78.1 / 78.1 / 78.1 (F) Region: Low		Operating Mode: 20.6 / 27.3 / 20.6		Altitude: 500. Ft.			
Anti-tam. Program: No										
Ann Arbor	MI	ASTM Class: C		Minimum Temp: 60. (F)		Maximum Temp: 84. (F)				
Base RVP: 11.5	In-use RVP: 11.5		In-use Start Yr: 2020							
Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDQV	LDQV	LDQV	MC	All Veh
Veh. Speeds:	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	
VMT Mix:	0.710	0.127	0.086		0.015	0.013	0.004	0.034	0.010	
Composite Emission Factors (Gm/Mile)										
Non-Meth HC:	4.39	4.64	5.17	4.86	8.85	0.60	0.72	2.51	5.31	4.435
Exhaust HC:	1.94	2.67	2.78	2.71	3.48	0.60	0.72	2.51	2.33	2.130
Evaporat HC:	0.92	0.87	1.27	1.03	2.98				2.98	0.947
Refuel L HC:	0.28	0.35	0.35	0.35	0.60					0.284
Running L HC:	1.25	0.75	0.77	0.76	1.60					1.072
Exhaust CO:	25.95	34.85	35.59	35.15	69.84	1.58	1.67	12.29	21.95	27.650
Exhaust NOx:	1.59	1.97	2.09	2.02	5.42	1.45	1.55	18.53	0.82	2.306

Cal. Year: 2000	I/M Program: No		Anti-tam. Program: No		Ambient Temp: 78.1 / 78.1 / 78.1 (F) Region: Low		Operating Mode: 20.6 / 27.3 / 20.6		Altitude: 500. Ft.	
Ann Arbor	MI	ASTM Class: C		Minimum Temp: 60. (F)		Maximum Temp: 84. (F)				
Base RVP: 11.5	In-use RVP: 11.5		In-use Start Yr: 2020							
Veh. Type:		LDGV	LDGT1	LDGT2	LDGT	HQGV	LDQV	LDQV	LDQV	LDQV
Veh. Speeds:		19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
VMT Mix:		0.693	0.116	0.085		0.015	0.035	0.017	0.029	0.010
Composite Emission Factors (Gm/Mile)										
Non-Meth HC:		2.97	3.04	3.11	3.07	6.30	0.46	0.63	2.05	4.86
Exhaust HC:		1.06	1.63	1.70	1.66	2.42	0.46	0.63	2.05	1.86
Evaporat HC:		0.58	0.57	0.55	0.56	1.70				3.00
										2.908
										1.208
										0.572

Refuel L HC:	0.25	0.33	0.33	0.33	0.54	1.39	1.55	10.88	21.44	0.245
Running L HC:	1.09	0.52	0.53	0.53	1.64	1.07	1.21	8.72	0.83	0.884
Exhaust CO:	16.14	22.85	23.82	23.26	37.43	1.07	1.21	8.72	0.83	17.028
Exhaust NOx:	1.07	1.48	1.47	1.47	4.30	1.07	1.21	8.72	0.83	1.418

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1  MOB11E4 Example 1d: OUTPUT = 4 (portrait 80 column) descriptive output format)
1  PROMPT - vertical flag input, no prompting
1  TAMFLG - default tapering rates
1  SPDFLG - one speed per scenario for all IV
1  VMFLAG - default vmt mix
1  MWRRFG - default registration and mileage accrual rates
1  NEWFLG - default exhaust emission rates
1  IMFLG - no I/M program
1  ALHFLG - no additional correction factor inputs
1  ATPFLG - no anti-tampering program
1  RLFLG - uncontrolled refueling losses
1  LOCFLG - read in local area parameters as 2nd req sc rec
1  TEMFLG - calculate exhaust temperatures
4  OUTFTM - portrait 80 column descriptive output format
4  PRFTLG - print exhaust HC, CO and NOx emission factor results
1  IDLFLG - do not print idle emissions results
2  NMHFLG - print NMHC
2  HCFLG - print HC components
1  80 19.6 75.0 20.6 27.3 20.6
Ann Arbor MI C 60. 84. 11.5 11.5 20
1  90 19.6 75.0 20.6 27.3 20.6
Ann Arbor MI C 60. 84. 11.5 11.5 20
1  00 19.6 75.0 20.6 27.3 20.6
Ann Arbor MI C 60. 84. 11.5 11.5 20

1st req sc rec: IREJN, ICY, SPD(1), AMBT, PCCN, PCNC, PCCC
LAP rec: SCNAME, RVPAST, TEMMIN, TEMMAX, RVPBAS, RVPBUS, RVPIUS, IUSES
1st req sc rec: IREJN, ICY, SPD(1), AMBT, PCCN, PCNC, PCCC
LAP rec: SCNAME, RVPAST, TEMMIN, TEMMAX, RVPBAS, RVPBUS, RVPIUS, IUSES
1st req sc rec: IREJN, ICY, SPD(1), AMBT, PCCN, PCNC, PCCC
LAP rec: SCNAME, RVPAST, TEMMIN, TEMMAX, RVPBAS, RVPBUS, RVPIUS, IUSES

```

MOBILE4 Example 1d: OUTFMT = 4 (portrait (80 column) descriptive output format)
Non-methane HC emission factors include evaporative HC emission factors.

Cal. Year: 1980	Region: Low		Altitude: 500. Ft.		78.1 / 78.1 F	
	I/M Program: No		Ambient Temp:		20.6 / 27.3 / 20.6	
Anti-tam. Program: No			Operating Mode:			
MI	ASTM Class: C					
Ann Arbor	Minimum Temp: 60. (F)		Maximum Temp: 84. (F)			
	Base RVP: 11.5		In-use (IU) RVP: 11.5		IU 1st Yr: 2020	
	LDGV	LDGT1	LDGT2	LDGI	HDGV	LDGV
Veh. Type:	19.6	19.6	19.6	19.6	19.6	19.6
Veh. Spd.: VMT Mix:	0.708	0.129	0.085	0.015	0.045	0.010
					MC	All Veh
Composite Emission Factors (Gm/Mile)						
No-Meth HC:	8.97	9.31	13.66	11.04	20.12	0.61
Exhaust HC:	4.29	4.78	6.96	5.65	10.16	0.61
Evap. HC:	2.36	2.13	4.01	2.88	6.78	0.82
Refuel HC:	0.41	0.48	0.48	0.48	0.82	0.41
Running HC:	1.91	1.91	2.20	2.03	2.36	1.50
Exhaust CO:	56.88	62.06	75.78	67.50	186.46	2.12
Exhaust NOx:	3.05	3.31	4.61	3.83	6.75	1.95
						15.55
						33.63
						0.47
						4.40

Cal. Year: 1990	Region: Low	Altitude: 500. Ft.
I/M Program: No	Ambient Temp: 78.1 / 78.1	78.1 / 78.1
Anti-tam. Program: No	Operating Mode:	20.6 / 27.3 / 20.6
MI	ASTM Class: C	
Ann Arbor	Minimum Temp: 60. (F)	Maximum Temp: 84. (F)
	Base RVP: 11.5	In-use (IU) RVP: 11.5
		IU 1st Vr: 2020
Veh. Type:	LDGV	LDGT1
Veh. Spd:	19.6	19.6
VMT Mix:	0.710	0.127
	LDGT2	LDGT
	19.6	19.6
	HDGV	LDGV
	19.6	19.6
	LDGT	HDGV
	19.6	19.6
	MC	All Veh
	0.010	0.010

	Composite Emission Factors (Gm/Mile)				
No-Meth HC:	4.39	4.64	5.17	4.86	8.85
Exhaust HC:	1.94	2.67	2.78	2.71	3.48
Evap. HC:	0.92	0.87	1.27	1.03	2.98
Refuel HC:	0.28	0.35	0.35	0.35	0.60
Running CO:	1.25	0.75	0.77	0.76	1.80
Exhaust CO:	25.95	34.85	35.59	35.15	69.84
Exhaust NOx:	1.59	1.97	2.09	2.02	5.42
					1.95
					1.55
					1.67
					12.29
					21.95
					27.65
					0.82
					2.31
					2.98
					2.33
					5.31
					4.43

Cal. Year:	2000	Region:	Low	Altitude:	500. Ft.
I/M Program:	No	Anti-tam. Program:	No	Ambient Temp:	78.1 / 78.1 / 78.1 F
MI		ASTM Class:	C	Operating Mode:	20.6 / 27.3 / 20.6
Ann Arbor		Minimum Temp:	60. (F)	Maximum Temp:	84. (F)
		Base RVP:	11.5	In-use (IU) RVP:	11.5
				IU 1st Yr:	2020
Veh. Type:	LDGV	LDGT1	<u>LDGT2</u>	HGVG	LDV
Veh. Spd.:	19.6	19.6	19.6	19.6	19.6
				LDDT	MDDV
				19.6	19.6
				MC	All Veh
				19.6	19.6

VMT Mix:	0.693	0.116	0.085	0.015	0.035	0.017	0.029	0.010
Composite Emission Factors (Gm/Mile)								
No-Mth HC:	2.97	3.04	3.11	3.07	6.30	0.46	0.63	2.91
Exhst HC:	1.06	1.70	1.66	2.42	0.46	0.63	2.05	4.86
Evap. HC:	0.58	0.57	0.55	0.56	1.70	2.05	1.86	1.21
Refuel HC:	0.25	0.33	0.33	0.33	0.54	3.00	0.24	0.24
Running HC:	1.09	0.52	0.53	1.64	0.63	0.63	0.88	0.88
Exhst CO:	16.14	22.85	23.82	23.26	37.43	1.39	1.55	17.03
Exhst NOx:	1.07	1.48	1.47	1.47	4.30	1.07	1.21	1.42

5-14

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1 PROMPT - vertical flag input, no prompting
MOBILE4 Example 2: RLFLAG = 3 (volatility and onboard control)
1 TAMFLG - default tampering rates
1 SPDFLG - one speed per scenario for all IV
1 VMFLG - default vmt mix
1 VMRRFG - default registration and mileage accrual rates
1 NMFLG - default exhaust emission rates
1 IMFLG - no I/M program
1 ALHFLG - no additional correction factor inputs
1 ATPFLG - no anti-tampering program
3 RLFLAG - refueling losses/onboard VRS
1 LOCFLG - read in local area parameters as 2nd req sc rec
1 TEMFLG - calculate exhaust temperatures
3 OUTPMT - MOBILE4 112 column descriptive output format
4 PRIFLG - print exhaust HC, CO and NOx emission factor results
1 IDLFLG - do not print idle emissions results
2 NMHFLG - print NMHC
2 HCFLAG - print HC components
93 2222 108MV, 1VOB
1 80 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCHC,PCCC
Ann Arbor MI C 60. 84. 11.5 9.0 90 LAP rec: SCNAME,RVPAST,TEMIN,TEMNAX,RVPBAS:RVPIUS,IUSESY
1 90 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCHC,PCCC
Ann Arbor MI C 60. 84. 11.5 9.0 90 LAP rec: SCNAME,RVPAST,TEMIN,TEMNAX,RVPBAS,RVPIUS,IUSESY
1 00 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCHC,PCCC
Ann Arbor MI C 60. 84. 11.5 9.0 90 LAP rec: SCNAME,RVPAST,TEMIN,TEMNAX,RVPBAS,RVPIUS,IUSESY

```


MOBILE4 Example 2: RLFLAG = 3 (volatility and onboard control)

Non-methane HC emission factors include evaporative HC emission factors.

Cal. Year: 1980	I/M Program: No	Ambient Temp: 78.1 / 78.1 (F)	Region: Low							
Anti-tam. Program: No	Operating Mode: 20.6 / 27.3 / 20.6	Altitude: 500. Ft.								
Ann Arbor MI	ASTM Class: C	Minimum Temp: 60. (F)	Maximum Temp: 84. (F)							
Base RVP: 11.5	In-use RVP: 9.0	In-use Start Yr: 1990								
Veh. Type:	LDGV <u>19.6</u>	LDGT1 <u>19.6</u>	LDGT2 <u>19.6</u>							
Veh. Speeds:	0.708	0.129	0.085							
VMT Mix:										
Composite Emission Factors (Gm/Mile)										
Non-Meth HC:	8.97	9.31	13.66	11.04	20.12	0.61	0.95	4.92	8.86	9.337
Exhaust HC:	4.29	4.78	6.96	5.65	10.16	0.61	0.95	4.92	6.57	4.697
Evaporat HC:	2.36	2.13	4.01	2.88	6.78				2.29	2.412
Refuel L HC:	0.41	0.48	0.48	0.48	0.82					0.407
Running L HC:	1.91	1.91	2.20	2.03	2.36					1.821
Exhaust CO:	56.88	62.06	75.78	67.50	186.46	1.50	2.12	15.55	33.63	58.632
Exhaust NOx:	3.05	3.31	4.61	3.83	6.75	1.50	1.95	28.91	0.47	4.396

Cal. Year: 1990	I/M Program: No	Ambient Temp: 78.1 / 78.1 (F)	Region: Low
Anti-tam. Program: No	Operating Mode: No	Operating Mode: 20.6 / 27.3 / 20.6	Altitude: 500. Ft.
Ann Arbor	MI	ASTM Class: C	Minimum Temp: 60. (F)
Base RVP: 11.5	In-use RVP: 9.0	In-use Start Yr: 1990	Maximum Temp: 84. (F)
LDGV	LDGT1	LDGT2	LDGV
19.6	19.6	19.6	19.6
0.710	0.127	0.086	0.013
HGV	LDGT	HGV	LDGV
19.6	19.6	19.6	19.6
0.015	0.004	0.034	0.010
HDV	LDGT	HDV	LDGV
19.6	19.6	19.6	19.6
0.034	0.004	0.034	0.010
MC	MC	MC	MC
19.6	19.6	19.6	19.6
0.010	0.010	0.010	0.010
Composite Emission Factors (Gm/Mile)			
Non-Meth HC:	2.87	3.38	3.53
Exhaust HC:	1.76	2.38	2.44
Evaporat HC:	0.52	0.49	0.59
Refuel L HC:	0.22	0.28	0.28
Running L HC:	0.36	0.23	0.22
Exhaust CO:	21.57	28.29	28.74
Exhaust NOx:	1.58	1.98	2.02
Non-Meth HC:	2.87	3.38	3.53
Exhaust HC:	1.76	2.38	2.44
Evaporat HC:	0.52	0.49	0.59
Refuel L HC:	0.22	0.28	0.28
Running L HC:	0.36	0.23	0.22
Exhaust CO:	21.57	28.29	28.74
Exhaust NOx:	1.58	1.98	2.02
Non-Meth HC:	2.87	3.38	3.53
Exhaust HC:	1.76	2.38	2.44
Evaporat HC:	0.52	0.49	0.59
Refuel L HC:	0.22	0.28	0.28
Running L HC:	0.36	0.23	0.22
Exhaust CO:	21.57	28.29	28.74
Exhaust NOx:	1.58	1.98	2.02
Non-Meth HC:	2.87	3.38	3.53
Exhaust HC:	1.76	2.38	2.44
Evaporat HC:	0.52	0.49	0.59
Refuel L HC:	0.22	0.28	0.28
Running L HC:	0.36	0.23	0.22
Exhaust CO:	21.57	28.29	28.74
Exhaust NOx:	1.58	1.98	2.02
Non-Meth HC:	2.87	3.38	3.53
Exhaust HC:	1.76	2.38	2.44
Evaporat HC:	0.52	0.49	0.59
Refuel L HC:	0.22	0.28	0.28
Running L HC:	0.36	0.23	0.22
Exhaust CO:	21.57	28.29	28.74
Exhaust NOx:	1.58	1.98	2.02
Non-Meth HC:	2.87	3.38	3.53
Exhaust HC:	1.76	2.38	2.44
Evaporat HC:	0.52	0.49	0.59
Refuel L HC:	0.22	0.28	0.28
Running L HC:	0.36	0.23	0.22
Exhaust CO:	21.57	28.29	28.74
Exhaust NOx:	1.58	1.98	2.02
Non-Meth HC:	2.87	3.38	3.53
Exhaust HC:	1.76	2.38	2.44
Evaporat HC:	0.52	0.49	0.59
Refuel L HC:	0.22	0.28	0.28
Running L HC:	0.36	0.23	0.22
Exhaust CO:	21.57	28.29	28.74
Exhaust NOx:	1.58	1.98	2.02
Non-Meth HC:	2.87	3.38	3.53
Exhaust HC:	1.76	2.38	2.44
Evaporat HC:	0.52	0.49	0.59
Refuel L HC:	0.22	0.28	0.28
Running L HC:	0.36	0.23	0.22
Exhaust CO:	21.57	28.29	28.74
Exhaust NOx:	1.58	1.98	2.02
Non-Meth HC:	2.87	3.38	3.53
Exhaust HC:	1.76	2.38	2.44
Evaporat HC:	0.52	0.49	0.59
Refuel L HC:	0.22	0.28	0.28
Running L HC:	0.36	0.23	0.22
Exhaust CO:	21.57	28.29	28.74
Exhaust NOx:	1.58	1.98	2.02
Non-Meth HC:	2.87	3.38	3.53
Exhaust HC:	1.76	2.38	2.44
Evaporat HC:	0.52	0.49	0.59
Refuel L HC:	0.22	0.28	0.28
Running L HC:	0.36	0.23	0.22
Exhaust CO:	21.57	28.29	28.74
Exhaust NOx:	1.58	1.98	2.02
Non-Meth HC:	2.87	3.38	3.53
Exhaust HC:	1.76	2.38	2.44
Evaporat HC:	0.52	0.49	0.59
Refuel L HC:	0.22	0.28	0.28
Running L HC:	0.36	0.23	0.22
Exhaust CO:	21.57	28.29	28.74
Exhaust NOx:	1.58	1.98	2.02

Cal. Year: 2000	I/M Program: No	Ambient Temp: 78.1 / 78.1 / 78.1 (F)	Region: Low							
Anti-tam. Program: No	Operating Mode: No	Operating Mode: 20.6 / 27.3 / 20.6	Altitude: 500. Ft.							
Ann Arbor MI	ASTM Class: C	Minimum Temp: 60. (F)	Maximum Temp: 84. (F)							
Base RVP: 11.5	In-use RVP: 9.0	In-use Start Yr: 1990								
Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDBGV	LDGV	LDOT	HDDV	MC	All Veh
Veh. Speeds:	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	
VMT Mix:	0.693	0.116	0.085		0.015	0.035	0.017	0.029	0.010	
Composite Emission Factors (Gm/Mile)										
Non-Meth HC:	1.48	1.78	1.83	1.80	3.77	0.46	0.63	2.05	3.73	1.571
Exhaust HC:	0.84	1.27	1.32	1.29	2.21	0.46	0.63	2.05	1.86	0.981
Evaporat HC:	0.26	0.27	0.27	0.27	0.88				1.87	0.269

Refuel L HC:	0.08	0.10	0.09	0.09	0.13	1.39	1.55	10.68	21.44	0.076
Running L HC:	0.30	0.15	0.15	0.15	0.55	1.07	1.21	8.72	0.83	0.245
Exhaust CO:	10.51	14.64	15.20	14.88	28.83	1.39	1.55	10.68	21.44	11.316
Exhaust NOx:	1.04	1.44	1.43	1.43	4.67	1.07	1.21	8.72	0.83	1.394

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PROMPT - vertical flag input, no prompting

MOBILE4 Example 3: ATPFLAG = 2 (Anti-tampering Prgm), LAPS = 1986, ICVIM = 1983

```

1 TAMFLG - default tampering rates
1 SPOFLG - one speed per scenario for all IV
1 VMFLAG - default vet mix
1 MYMRFG - default registration and mileage accrual rates
1 NEMFLG - default exhaust emission rates
2 IMFLAG - I/M program
1 ALHFLG - no additional correction factor inputs
2 ATPFLG - anti-tampering program
1 RLFLAG - uncontrolled refueling losses
1 LOCFLG - read in local area parameters
1 TENFLG - calculate exhaust temperatures
3 OUTFMT - MOBILE4 112 column descriptive output format
4 PRIFLG - print exhaust HC, CO and NOx emission factor results
1 IDLFLG - do not print idle emissions results
2 NMHFLG - print NMHC
1 HCFLAG - do not print HC components
83 30 68 20 10 070 2 2 2221 2 11 I/M program: ICVIM,ISTRIN,MODVR1/2,WAIVER(1-2),CRIM,INTYP,IFREQ,ILDT(1-4),ITEST,MUDATA(1-2)
86 75 20 2111 11 090 22211221 ATP parameters: start, 1st myr, last myr, veh types, insp pgm & freq, compliance, disablements
1 79 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCHC,PCCC
Ann Arbor MI C 60, 84, 11.5 11.5 20 LAP rec: SCNAME,RVPAST,TEMIN,TEMMA,RVPBAS,RVPIUS,IUSESY
1 80 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCHC,PCCC
Ann Arbor MI C 60, 84, 11.5 11.5 20 LAP rec: SCNAME,RVPAST,TEMIN,TEMMA,RVPBAS,RVPIUS,IUSESY
1 90 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCHC,PCCC
Ann Arbor MI C 60, 84, 11.5 11.5 20 LAP rec: SCNAME,RVPAST,TEMIN,TEMMA,RVPBAS,RVPIUS,IUSESY
1 00 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCHC,PCCC
Ann Arbor MI C 60, 84, 11.5 11.5 20 LAP rec: SCNAME,RVPAST,TEMIN,TEMMA,RVPBAS,RVPIUS,IUSESY
1 20 19.6 75.0 20.6 27.3 20.6 1st req sc rec: IREJN,ICV,SPD(1),AMBT,PCCN,PCHC,PCCC
Ann Arbor MI C 60, 84, 11.5 11.5 20 LAP rec: SCNAME,RVPAST,TEMIN,TEMMA,RVPBAS,RVPIUS,IUSESY

```

MOBILE4 Example 3: ATPFLG = 2 (Anti-tampering Prgm), LAPSY = 1986, ICYIM = 1983

M108 Warning: The ATP compliance rate of 90.0 is not equal to the I/M compliance rate of 70.0
 M109 Warning: The ATP inspection frequency is Annual and the I/M inspection frequency is Biennial
 M110 Warning: The ATP inspection type is Central the I/M inspection type is Dec Comp
 I/M program selected:

Start year (January 1):	1983
Pre-1981 MVR stringency rate:	30%
First model year covered:	1968
Last model year covered:	2020
Waiver rate (pre-1981):	20.%
Waiver rate (1981 and newer):	10.%
Compliance Rate:	70.%
Inspection type:	Computerized decentralized
Inspection frequency:	Biennial
Vehicle types covered:	LDGV - Yes
	LDGT1 - Yes
	LDGT2 - Yes
	HDGV - No
	2500 rpm / Idle

1981 & later MVR test type:

Anti-tampering program selected:

Start year (January 1):	1986
First model year covered:	1975
Last model year covered:	2020
Vehicle types covered:	LDGV

Type:	Centralized
Frequency:	Annual
Compliance Rate:	90.0%
Air pump system disablements:	Yes
Catalyst removals:	Yes
Fuel inlet restrictor disablements:	Yes
Tailpipe lead deposit test:	No
EGR disablement:	No
Evaporative system disablements:	Yes
PCV system disablements:	Yes
Missing gas caps:	No

Non-methane HC emission factors include evaporative HC emission factors.

Cal. Year: 1979	I/M Program: Yes	Ambient Temp: 78.1 / 78.1 / 78.1 (F)	Region: Low
	Anti-tam. Program: Yes	Operating Mode: 20.6 / 27.3 / 20.6	Altitude: 500. Ft.
Ann Arbor	MI	ASTM Class: C	Minimum Temp: 60. (F)
Base RVP: 11.5	In-use RVP: 11.5	In-use Start Yr: 2020	Maximum Temp: 84. (F)

MI		ASTM Class: C		Minimum Temp: 60. (F)		Maximum Temp: 84. (F)	
Ann Arbor Base RVP: 11.5		In-use RVP: 11.5		In-use Start Yr: 2020			
Veh. Type:		LDGV		LDGT		LDGV	
Veh. Speeds:		19.6		19.6		19.6	
VMT Mix:		0.684		0.112		0.086	
Composite Emission Factors (Gm/Mile)		2.65		2.61		6.03	
Non-Meth HC:		2.53		2.58		2.58	
Exhaust CO:		12.08		18.05		18.46	
Exhaust NOx:		0.95		1.30		4.19	
						0.50	
						1.45	
						1.10	
						0.68	
						1.60	
						1.23	
						2.03	
						10.78	
						8.05	
						4.86	
						21.44	
						0.83	
						2.483	
						13.054	
						1.286	

```

1 PROMPT - vertical flag input, no prompting
MOBILE4 Example 4: MYMRFG = 4 (New mileage accrual rates & registration dist)
1 TAMFLG - default tempering rates
1 SPDFLG - one speed per scenario for all IV
1 VMFLAG - default vmt mix
1 MYMRFG - new registration and mileage accrual rates
1 NEMFLG - default exhaust emission rates
1 IMFLAG - no I/M program
1 ALHFLG - no additional correction factor inputs
1 ATPFLG - no anti-tempering program
1 RLFLAG - uncontrolled refueling losses
1 LOCFLG - read in local area parameters as 2nd req sc rec
1 TEMFLG - calculate exhaust temperatures
3 OUTFWT - MOBILE4 112 column descriptive output format
4 PRTELG - print exhaust HC, CO and NOx emission factor results
1 IDLFLG - do not print idle emissions results
2 NMHFLG - print NMHC
1 HCFLAG - do not print HC components
1 12800 .12100 .11400 .10800 .10200 .09600 .09100 .08600 .08100 .07600 .07100 .06600 .06100 .05600 .05100 .04600 .04100 .03600 .03100 .02600 .02100 .01600 .01100 .00600 .00100
1 07200 .06800 .06400 .06100 .05700 .05400 .05100 .04800 .04500 .04200 .03900 .03600 .03300 .03000 .02700 .02400 .02100 .01800 .01500 .01200 .00900 .00600 .00300 .00000
1 17400 .16100 .15000 .13900 .12900 .11900 .11000 .10300 .09500 .08800 .08100 .07400 .06700 .06000 .05300 .04600 .03900 .03200 .02500 .01800 .01100 .00400 .00000
1 08200 .07600 .07000 .06500 .06100 .05600 .05200 .04800 .04500 .04200 .03900 .03600 .03300 .03000 .02700 .02400 .02100 .01800 .01500 .01200 .00900 .00600 .00300 .00000
1 18400 .16900 .15600 .14400 .13300 .12300 .11400 .10500 .09700 .09000 .08300 .07600 .06900 .06200 .05500 .04800 .04100 .03400 .02700 .02000 .01300 .00600 .00000
1 08300 .07600 .07100 .06500 .06000 .05600 .05200 .04800 .04500 .04200 .03900 .03600 .03300 .03000 .02700 .02400 .02100 .01800 .01500 .01200 .00900 .00600 .00300 .00000
1 19900 .18100 .16400 .14800 .13400 .12100 .11000 .10000 .09000 .08200 .07500 .06800 .06100 .05400 .04700 .04000 .03300 .02600 .01900 .01200 .00500 .00000
1 07400 .06700 .06100 .05500 .05000 .04500 .04100 .03700 .03300 .03000 .02700 .02400 .02100 .01800 .01500 .01200 .00900 .00600 .00300 .00000
1 12800 .12100 .11400 .10800 .10200 .09600 .09100 .08600 .08100 .07600 .07100 .06600 .06100 .05600 .05100 .04600 .04100 .03600 .03100 .02600 .02100 .01600 .01100
1 07200 .06800 .06400 .06100 .05700 .05400 .05100 .04800 .04500 .04200 .03900 .03600 .03300 .03000 .02700 .02400 .02100 .01800 .01500 .01200 .00900 .00600 .00300 .00000
1 17500 .16300 .15100 .14000 .12900 .12000 .11100 .10300 .09500 .08800 .08100 .07400 .06700 .06000 .05300 .04600 .03900 .03200 .02500 .01800 .01100 .00400 .00000
1 08200 .07600 .07000 .06500 .06000 .05600 .05200 .04800 .04500 .04200 .03900 .03600 .03300 .03000 .02700 .02400 .02100 .01800 .01500 .01200 .00900 .00600 .00300 .00000
1 19900 .18100 .16400 .14800 .13400 .12100 .11000 .10000 .09000 .08200 .07500 .06800 .06100 .05400 .04700 .04000 .03300 .02600 .01900 .01200 .00500 .00000
1 07400 .06700 .06100 .05500 .05000 .04500 .04100 .03700 .03300 .03000 .02700 .02400 .02100 .01800 .01500 .01200 .00900 .00600 .00300 .00000
1 04100 .02800 .02100 .01600 .01200 .00800 .00600 .00400 .00200 .00200 .00200 .00200 .00200 .00200 .00200 .00200 .00200 .00200 .00200 .00200 .00200 .00200 .00200 .00200
1 00200 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000
1 075 .107 .107 .106 .100 .092 .085 .077 .066 .052 .043 .033 .023 .013 .003 .000 .000 .000 .000 .000 .000 .000 .000 .000
1 039 .027 .018 .014 .009 .006 .005 .005 .005 .004 .003 .002 .001 .001 .001 .001 .001 .001 .001 .001 .001 .001 .001 .001
1 061 .095 .094 .103 .083 .076 .076 .063 .054 .043 .033 .023 .013 .003 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000
1 036 .024 .030 .028 .026 .024 .022 .020 .018 .016 .015 .014 .013 .012 .011 .010 .009 .008 .007 .006 .005 .004 .003 .002
1 037 .070 .078 .086 .075 .075 .075 .068 .059 .053 .043 .033 .023 .013 .003 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000
1 044 .032 .038 .036 .034 .032 .030 .028 .026 .024 .023 .022 .021 .020 .019 .018 .017 .016 .015 .014 .013 .012 .011 .010
1 037 .070 .078 .086 .075 .075 .075 .068 .059 .053 .043 .033 .023 .013 .003 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000
1 044 .032 .038 .036 .034 .032 .030 .028 .026 .024 .023 .022 .021 .020 .019 .018 .017 .016 .015 .014 .013 .012 .011 .010
1 075 .107 .107 .106 .100 .092 .085 .077 .066 .052 .043 .033 .023 .013 .003 .000 .000 .000 .000 .000 .000 .000 .000 .000
1 039 .027 .018 .014 .009 .006 .005 .005 .005 .004 .003 .002 .001 .001 .001 .001 .001 .001 .001 .001 .001 .001 .001 .001
1 061 .095 .094 .103 .083 .076 .076 .063 .054 .043 .033 .023 .013 .003 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000
1 036 .024 .030 .028 .026 .024 .022 .020 .018 .016 .015 .014 .013 .012 .011 .010 .009 .008 .007 .006 .005 .004 .003 .002
1 077 .135 .134 .131 .099 .090 .082 .062 .045 .033 .023 .013 .003 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000
1 025 .015 .013 .011 .010 .008 .007 .006 .005 .004 .003 .023 .013 .003 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000
1 105 .225 .208 .149 .097 .062 .046 .033 .023 .023 .023 .023 .023 .023 .023 .023 .023 .023 .023 .023 .023 .023 .023 .023
1 008 .005 .013 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000
1 80 19.6 75.0 20.6 27.3 20.6
Ann Arbor MI C 60. 84. 11.5 11.5 20
1 90 19.6 75.0 20.6 27.3 20.6
Ann Arbor MI C 60. 84. 11.5 11.5 20
1 00 19.6 75.0 20.6 27.3 20.6
Ann Arbor MI C 60. 84. 11.5 11.5 20

```

```

1st req sc rec: IREJN, ICY, SPD(1), AMBT, PCCN, PCHC, PCCC
LAP rec: SCNAME, RVBPAST, TEMMIN, TEMMAX, RVBPAS, RVPIUS, IUSESY
1st req sc rec: IREJN, ICY, SPD(1), AMBT, PCCN, PCHC, PCCC
LAP rec: SCNAME, RVBPAST, TEMMIN, TEMMAX, RVBPAS, RVPIUS, IUSESY
1st req sc rec: IREJN, ICY, SPD(1), AMBT, PCCN, PCHC, PCCC
LAP rec: SCNAME, RVBPAST, TEMMIN, TEMMAX, RVBPAS, RVPIUS, IUSESY

```

MOBILE4 Example 4: MYMRFG = 4 (New mileage accrual rates & registration dist)

M 49 Warning: 0.999 MYR sum not = 1. (will normalize)

M 49 Warning: 0.992 MYR sum not = 1. (will normalize)

M 49 Warning: 0.999 MYR sum not = 1. (will normalize)

M 49 Warning: 0.992 MYR sum not = 1. (will normalize)

M 49 Warning: 0.992 MYR sum not = 1. (will normalize)

M 49 Warning: 1.00 MYR sum not = 1. (will normalize)

M 21 Warning: 0.500E-02 registration with zero mileage

M 21 Warning: 0.130E-01 registration with zero mileage.

Non-methane HC emission factors include evaporative HC emission factors.

User supplied mileage accrual distributions, veh registration distributions.

Cal. Year: 1980 I/M Program: No Ambient Temp: 78.1 / 78.1 / 78.1 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.Ann Arbor MI ASTM Class: C Minimum Temp: 60. (F) Maximum Temp: 84. (F)
Base RVP: 11.5 In-use RVP: 11.5 In-use Start Yr: 2020

Veh. Type:	LDCV	LDGT1	LDGT2	LDGT	HQGV	LDGV	LDOT	HDDV	MC	All Veh
Veh. Speeds:	19.6	19.6	19.6		19.6	19.6	19.6	19.6	19.6	
VMT Mix:	0.740	0.139	0.083		0.013	0.006	0.001	0.012	0.006	

Composite Emission Factors (Gm/Mile)

Non-Meth HC:	7.30	9.06	14.50	11.09	22.31	0.58	0.94	4.06	8.30	8.265
Exhaust CO:	47.07	62.37	81.10	69.36	209.39	1.46	2.11	13.10	28.79	53.367
Exhaust NOx:	2.89	3.29	4.80	3.86	7.12	1.48	1.94	26.33	0.55	3.410

User supplied mileage accrual distributions, veh registration distributions.

Cal. Year: 1980 I/M Program: No Ambient Temp: 78.1 / 78.1 / 78.1 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.Ann Arbor MI ASTM Class: C Minimum Temp: 60. (F) Maximum Temp: 84. (F)
Base RVP: 11.5 In-use RVP: 11.5 In-use Start Yr: 2020

Veh. Type:	LDCV	LDGT1	LDGT2	LDGT	HQGV	LDGV	LDOT	HDDV	MC	All Veh
Veh. Speeds:	19.6	19.6	19.6		19.6	19.6	19.6	19.6	19.6	

VTM Mix:	0.735	0.136	0.083	0.013	0.011	0.004	0.012	0.006
Composite Emission Factors (Gm/Mile)								
Non-Meth HC:	3.11	4.40	5.85	4.95	0.49	0.72	2.37	3.582
Exhaust CO:	15.94	33.98	40.37	36.34	1.42	1.67	11.17	21.052
Exhaust NOX:	1.15	1.94	2.30	2.08	1.34	1.56	18.00	1.614

User supplied mileage accrual distributions, veh registration distributions.

Cal. Year: 2000 I/M Program: No Ambient Temp: 78.1 / 78.1 / 78.1 (F) Region: Low
 Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Ann Arbor MI ASTM Class: C Minimum Temp: 60. (F) Maximum Temp: 84. (F)
 Base RVP: 11.5 In-use RVP: 11.5 In-use Start Yr: 2020

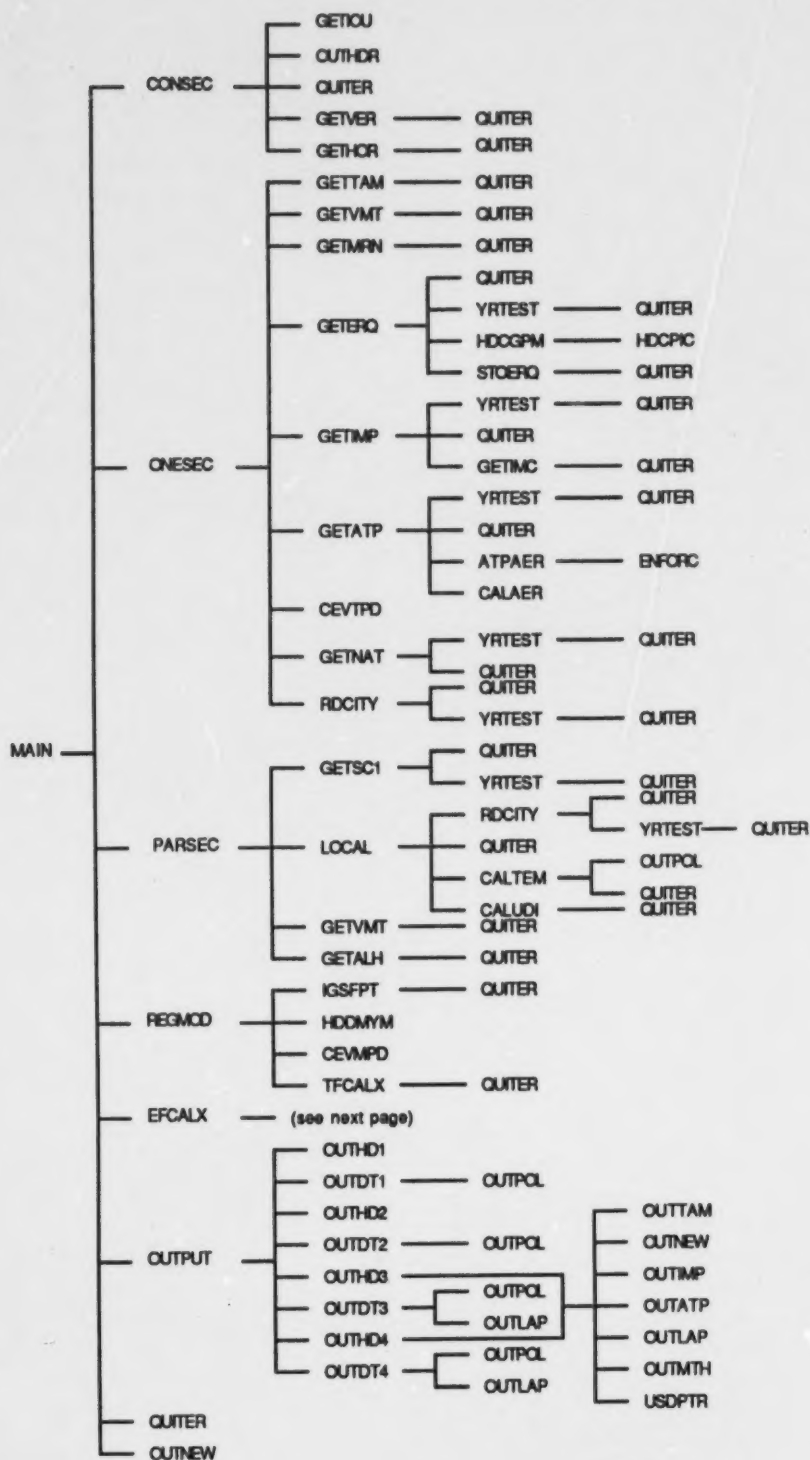
Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	MDGV	LDGV	LDGT	MDGV	MC	All Veh
Veh. Speeds:	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	
VTM Mix:	0.714	0.122	0.082	0.082	0.013	0.033	0.018	0.012	0.006	

Composite Emission Factors (Gm/Mile)										
Non-Meth HC:	2.64	3.08	3.44	3.22	6.92	0.41	0.63	2.04	5.96	2.720
Exhaust CO:	12.61	23.50	26.82	24.83	40.71	1.32	1.55	10.21	19.45	14.931
Exhaust NOX:	0.95	1.51	1.60	1.55	4.47	1.00	1.20	8.43	0.83	1.213

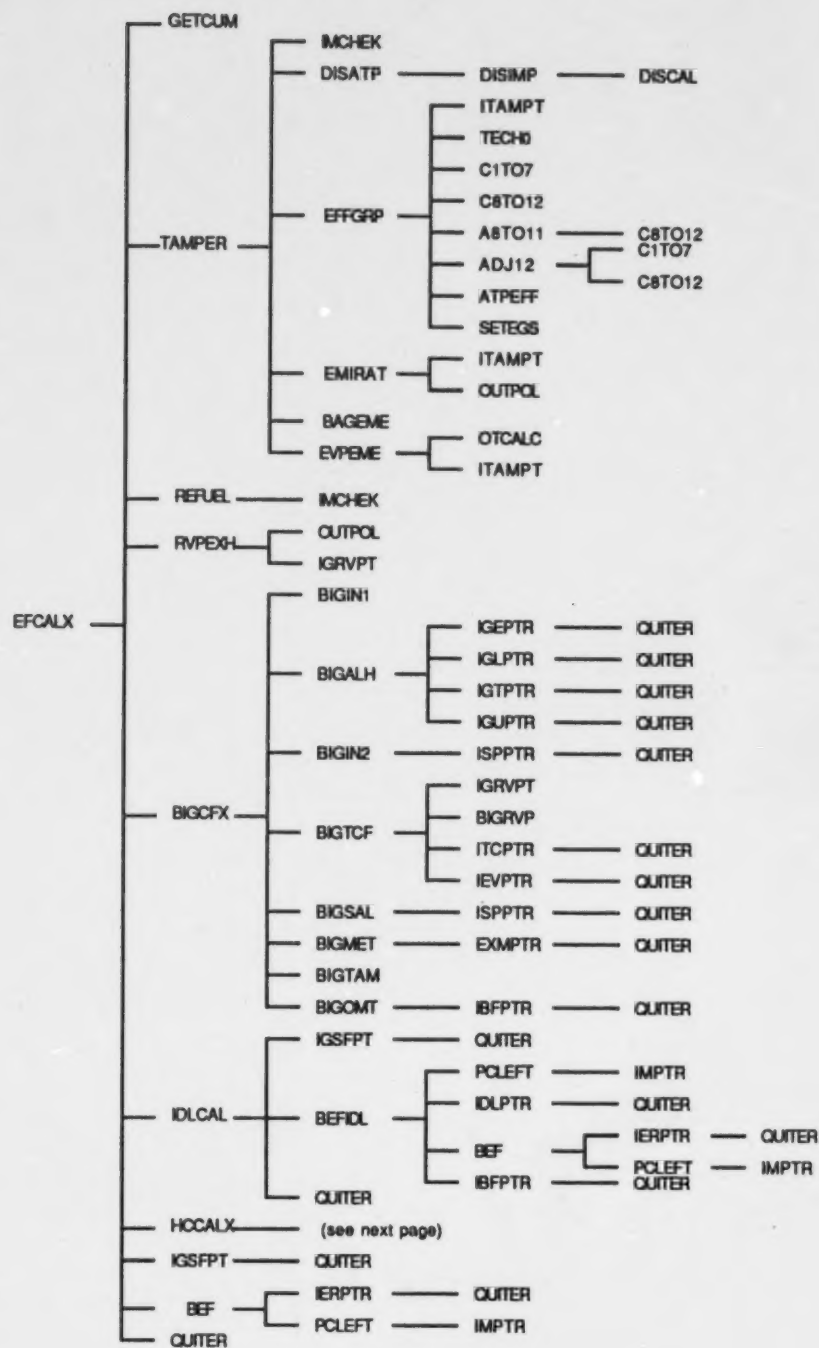
Appendix A

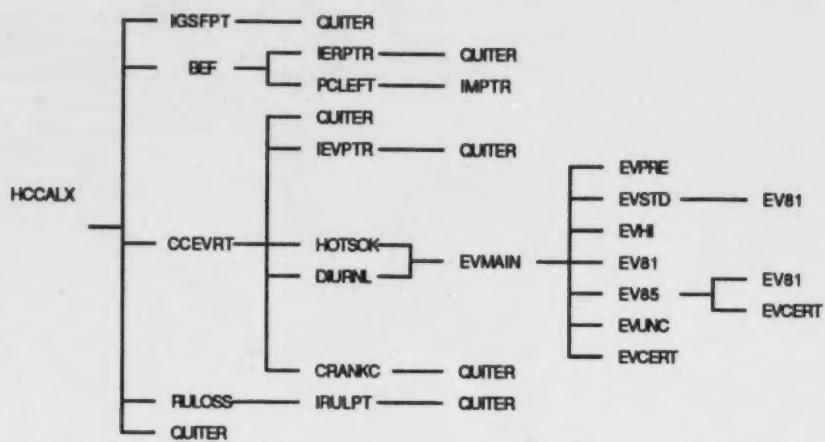
MOBILE4 STRUCTURE CHART

MOBILE4 STRUCTURE CHART



MOBILE4 STRUCTURE CHART



MOBILE4 STRUCTURE CHART

Appendix B

MOBILE4 MODULE DICTIONARY

Appendix B

MOBILE4 MODULE DICTIONARY

Each module of the MOBILE4 program is listed below, in the order in which they appear in the source code, along with a brief statement of the purpose and function of each. After the MAIN (driver) and QUITER modules, there are five functional categories of modules: input, processing (calculation), pointer (index), output, and block data.

<u>Module</u>	<u>Purpose</u>
MAIN	This is the MOBILE4 driver. It sets up the run and then loops through scenarios.
QUITER	Prints error, warning, and comment messages on I/O unit IOUERR.

Input Modules

<u>Module</u>	<u>Purpose</u>
CONSEC	Reads in and validates the Control Section flags; sets input mode for run; resets output units (if requested); and reads in and stores the run title.
GETIOU	Reads in and parses the prompt/mode flag. GETIOU also reads in user supplied output unit numbers, if present, and assigns the acceptable numbers to the appropriate I/O unit names.
GETVER	Reads in and validates Control Section Flags via the vertical input mode (one flag per line, format I1).
GETHOR	Reads in and validates Control Section flags via the horizontal input mode (all flags entered on a single line, format I1, 1X, 1X,...,I1).
ONESEC	If control flags indicate that One-time Data are to be supplied, reads in, validates, and stores the data.
GETTAM	Reads in, validates, and stores replacement tampering rates.
GETVMT	Gets the fleet vehicle miles travelled (VMT) mix by vehicle type.
GETMRN	Checks for and reads in and screens user supplied mileage accurat rates and/or registration distributions. Whether or not the distributions are replaced, they are normalized.
GETERQ	Reads in, performs range checks on, converts to g/mi (if NEWVEH = HDV), and stores replacement emission factor rates and their associated parameters.
YRTEST	Converts 2-digit input year to 4-digit year then checks whether or not year is in the acceptable range.
HDCGPM	Converts user entered new emission rates from grams per brake-horsepower (g/BHP-hr) to grams per mile (g/mi) units.
HDCPIC	Selects the HDV g/BHP-hr to g/mi units conversion factor.

Input Modules

<u>Module</u>	<u>Purpose</u>
STOERQ	Attempts to store the user supplied specifications for new FTP basic emission rate equations, and when successful (i.e., when room found in the user-supplied rate arrays) zeroes out all idle coefficients for the specified pollutant, vehicle, and region combination.
GETIMP	Reads in and processes the I/M Program parameter record and, if requested, calls GETIMC to get alternate I/M credits.
GETIMC	Reads in user-supplied alternate I/M credits.
GETATP	Reads in and verifies user supplied anti-tampering program parameters; calls ATPAER and CALAER to generate the anti-tampering effectiveness rates for the run.
ATPAER	Generates the base anti-tampering effectiveness rate matrices, based on a subset of the anti-tampering program parameters.
ENFORC	Computes the enforcement rate, given the corresponding compliance rate, for either I/M or ATP.
CALAER	Calculates the effect of an anti-tampering program on tampering rates and stores the results in the right anti-tampering effectiveness matrix.
WTLRUL	Weights together the 13 trip length cases for each running loss HC combination of temperature/volatility/model year group/vehicle type, for both the base and tampered emission rate tables.
CEVTPD	Calculates trips per day, by the type and relative (to calendar year of evaluation) age of the vehicle. Since relative age is used, one set of rates is calculated for use on all scenarios of the run.
GETNAT	Reads in and processes parameters for refueling loss HC controls (Stage II and/or onboard vapor recovery systems), if required.

Input Modules

<u>Module</u>	<u>Purpose</u>
RDCITY	Reads in the Local Area Parameters (LAP) record.
PARSEC	Reads in and validates the Scenario Data section variables.
GETSC1	Reads in and validates the first required scenario parameter record (scenario descriptive record).
LOCAL	Initializes the local data common blocks, using the Local Area Parameters.
CALTEM	Calculates exhaust, evaporative, and running loss temperatures for the given scenario from the input minimum and maximum daily temperatures.
CALUDI	Uses passed in fuel RVP levels, minimum and maximum daily temperatures for the given scenario from the input minimum and maximum daily temperatures.
GETALH	Reads in and validates the optional correction factor (CF) parameters record (air conditioning, extra load, trailer towing, and humidity) used in BIGAHL.
REGMOD	Modifies model year mileage/registration arrays to account for the requested evaluation year, time frame of the data, and projected fleet sales fractions.
HDDMYM	Computes annual weighted calendar year mileage for heavy-duty diesel vehicles.
CEVMPD	Calculates miles per day by the type and relative (to calendar year of evaluation) age of the vehicle.
TFCALX	Computes the travel fractions, VMT mix, and registration mix.

Processing Modules

<u>Module</u>	<u>Purpose</u>
EFCALX	Driver routine for the processing section. Calculates composite emission factors for the given scenario.
GETCUM	Computes average January 1, fleet cumulative mileages.
TAMPER	Computes exhaust tampering effects on bag 1, 2, and 3 exhaust HC, CO, and NOx emissions; on idle on HC, CO and NOx emissions; and on crankcase, hot soak, and diurnal evaporative HC emissions.
IMCHEK	Determines whether or not an I/M program applies to a given vehicle type/model year combination.
DISATP	Computes the disablement rates for the given vehicle type, model year and mileage distribution. If the start year of an anti-tampering program precedes the evaluation year, then two sets of rates are produced (one applying through the ATP start year, the other to the entire 20-model-year window.
DISIMP	Takes the passed in ATP case, determines which I/M case applies, calls DISCAL to calculate it, and (if necessary) substitutes (Non-I/M)/(I/M) line limit values.
DISCAL	Computes the disablement rate for the given vehicle type, model year interval, I/M program (or lack thereof), mileage distribution, and disablement class.
EFFGRP	Builds the tampering effects group sizes array. The tampering rates from DISATP are modified to account for technology vs tampering types, overlap factors, anti-tampering effectiveness factors, and technology group sizes. The rates returned are divided into effects groups corresponding to the significant emission impact tampering groups.
EMIRAT	Computes and assigns emission impact rates or the tampering effects groups.
BAGEME	Multiplies the effects group sizes by the corresponding weighted emission impact rates to get the tampering bag emission effects and idle tampering offsets.

Processing Modules

<u>Module</u>	<u>Purpose</u>
EVPEME	Does the same work for evaporative and crankcase HC as EFFGRP, EMIRAT and BAGEME do for exhaust, producing the evaporative/running loss tampering rates and crankcase HC emission offset.
OTCALC	Returns a component of the Overall Tampering Rate (OTR) equation.
TECH0	Determines whether or not to compute the effects groups for the passed in TGSUSE/IQG/IPG values. If the effects loop is to be completed, TECH0 decides what subset of the basic tampering rates is to be used.
C1T07	Calculates overlap categories 1 to 7 for tampering effects. These cover all the allowable overlap combinations of the 4 base tampering cases for the bag effects for the given pollutant group.
C8T012	Calculates category sizes 8 to 12 for tampering effects. Categories 8 to 11 are the no overlap cases. Category 12 is the no tampering at all case.
A8T011	Adjusts effects category sizes when one or more of the no overlap categories (8 to 11) are negative.
ADJ12	Adjusts all category sizes to eliminate a negative category 12 size.
ATPEFF	Applies the anti-tampering effectiveness factors to the 11 positive tampering effect categories.
SETEGS	Sets the effects group sizes by combining subsets of the overlap category sizes and weighting by the corresponding technology group sizes.
REFUEL	Computes refueling loss HC emission factors (in g/mi) by relative model year for the four vehicle types affected.
RVPEXH	Generates the RVP exhaust emission factor CFs, for the neutral (no adjustment) and model year group 1 (1971-79 LDGV/T HC and CO) cases.

Processing Modules

<u>Module</u>	<u>Purpose</u>
BIGCFX	Computes CFS to be applied to the composite emission factors. User selected options and data determine the adjustments (if any) for the following variables: speed, air conditioning, humidity, extra loading, trailer towing, temperature, by-bag RVP, operating model, methane, and tampering.
BIGIN1	Sets up the BIGCFX coefficient calculations loops by initializing parameters and variables/arrays used in those calculations.
BIGALH	Computes the optional emission factor CFs for air conditioning, humidity, extra loading, and trailer towing for vehicle types LDGV, LDGT1, LDGT2, and LDGT (composite of LDGT1 and LDGT2). The humidity correction is also applied to MCs.
BIGIN2	Initializes the vehicle-class-specific parameters and flags used subsequently by BIGCFX in the calculation of emission factor CFs and offsets.
BIGTCF	Computes the multiplicative temperature CF and, in some cases, the RVP CF and/or additive temperature CO offset.
BIGRVP	Computes the combined temperature and RVP correction factor (CF) used when the pollutant temperature (T) is at or above 75.0°F (FTP standard), and the RVP CF alone when T is below 75.0°F.
BIGSAL	Computes SALHCF, the speed (and, if LDGV/T or MC, optional adjustments) multiplicative CF table.
BIGMET	Takes the additive tampering offset from TAMPER and corrects it for operating mode, temperature and, if appropriate, RVP.
BIGOMT	Computes the basic emission factor's multiplicative correction for operating mode and temperature.
HCCALX	Calculates HC emission factors.

Processing Modules

<u>Module</u>	<u>Purpose</u>
CCEVRT	Returns a combined evaporative (hot soak + diurnal) and crankcase HC emission factor. The hot soak value is weighted by trips per day, and the evaporative sum is weighted by miles per day.
HOTSOK	Selects the yearly value for hot soak HC.
DIURNL	Selects the yearly value for diurnal HC.
OLDMPD	Selects the old MOBILE3 fixed (not varying with VMT) yearly value for miles/day. Not called in release MOBILE4.
CRANKC	Selects the yearly value for crankcase HC.
EVMAIN	Is the driver ("main") for the block of functions that calculate hot soak or diurnal rates, given the vehicle type, emission standard, base/in-use/certification fuel RVP index, and the non-tampered/uncontrolled/certification equation group specified in the parameter list.
EVPRE	Calculates a hot soak or diurnal rate for a pre-control emission standard, given the vehicle type and fuel RVP or Wade Index, respectively.
EVSTD	Calculates the hot soak or diurnal rate for a standard in the controlled (to pre-810 LDGV and LDGT1/2 classes, given the fuel RVP or Wade Index, respectively.
EVHI	Calculates the high-altitude, 1972-76 model year, hot soak or diurnal for LDGVs and LDGT1s, given the fuel RVP or Wade Index, respectively.
EV81	Calculates a hot soak or diurnal rate for the 1985+HDGV emission standard, given the equation group and the fuel RVP or Wade Index, respectively.
EV85	Calculates a hot soak or diurnal rate for the 1985+HDGV emission standard, given the equation group and the fuel RVP or Wade Index, respectively.

Processing Modules

<u>Module</u>	<u>Purpose</u>
EVUNC	Calculates a hot soak or diurnal for an uncontrolled emission equation, given the emission standard context (vehicle class, model year, etc.) and the fuel RVP.
EVCERT	Calculates hot soak or diurnal emission rate assuming a change in certification fuel volatility, given the fuel delivery system and the fuel RVP or Wade Index, respectively.
RULOSS	Computes (using four-point linear interpolation) the running loss emission rate for each model year and gasoline-fueled vehicle class, at the given RVP and running loss temperature.
BEF	Returns the basic emission factor adjusted for operating mode, CO temperature offset, methane offset, temperature, RVP (some cases), inspection/maintenance program effects, and tampering offset.
PCLEFT	Determines the basic emission factor multiplicative adjustment (= percentage left of BEF = PCLEFT) for the effects of an inspection/maintenance (I/M) program, after checking whether or not I/M applies to the factor being computed by the calling function.
IDLCAL	Calculates the idle emission factors.
BEFIDL	Returns the basic idle emission factor adjusted for operating mode, I/M, methane and tampering, as appropriate.

Pointer Modules

<u>Module</u>	<u>Purpose</u>
IGEPTTR	Selects the model year group (MYG) pointer to the fraction of vehicles equipped with air conditioning.
IGUPTR	Selects the MYG pointer to the fraction of vehicles using air conditioning.
IGLPTR	Selects the MYG pointer to the fraction of vehicles with trailer in tow.
IBFPTR	Selects the MYG pointer to the normalized bag fraction coefficient arrays, by vehicle type and model year group.
IERPTR	Selects the array pair and the MYG pointer into the intercept and slope arrays for the FTP base emission rate equations.
ISPPTR	Selects the MYG pointer to the bag speed normalization coefficients or the speed CF for LDGV, LDGT1, LDGT2 and MC.
EXMPTR	Selects the MYG pointer to the non-methane fractions.
ITCPTR	Selects the MYG pointer to the temperature correction coefficients.
IGSFPT	Selects the MYG pointer to the gas/diesel sales fractions.
ITAMPT	Selects the MYG pointer to the desired value for 1 of 5 different tampering data cases.
IEVPTR	Selects MYG pointers for evaporative, hot soak, or diurnal HC calculation data, one to appropriate emission standard and one to MYG based on fuel-injected fraction of fleet.
IGRVPT	Selects the MYG pointer to the RVP CF data.
IDLPTR	Selects the MYG pointer to the slope and intercept arrays for the idle emission rate equation.

Pointer Modules

<u>Module</u>	<u>Purpose</u>
IMPTR	Selects the emission control technology MYG pointer to the I/M credits arrays for LDGV/T.
IRULPT	Selects the MYG pointer to the running loss base emission rate for the given model year and vehicle class.

Output Modules

<u>Module</u>	<u>Purpose</u>
OUTPUT	Writes scenario results on I/O unit IOUREP.
OUTHD1	Writes the run header on unit IOUREP using output format 1.
OUTHD2	Writes the run header on unit IOUREP using output format 2.
OUTHD3	Writes the run header on unit IOUREP using output format 3.
OUTHD4	Writes the run header on unit IOUREP using output format 4.
OUTHDR	Writes the output header (= run title = PROJID) on unit IOUOUT.
OUTTAM	Prints the user-supplied replacement tampering rates.
OUTNEW	Writes out the new (user-supplied replacement) basic emission rate parameters and data.
OUTIMP	Prints the I/M program parameters and, if entered, the alternate I/M credits set name.
OUTATP	Prints the anti-tampering program (ATP) parameters.
OUTMTH	Writes total/non-methane evaporative HC message on I/O unit IOUREP.
USDPTR	Finds the pointers into the user-supplied data name array
OUTDT1	Writes scenario parameters and emission factor (EF) results on unit IOUREP using output format 1.
OUTDT2	Writes scenario parameters and EF results on unit IOUREP using output format 2.
OUTDT3	Writes scenario parameters and emission factor results on unit IOUREP using output format 3.
OUTDT4	Writes scenario parameters and EF results on unit IOUREP using output format 4.

Output Modules

<u>Module</u>	<u>Purpose</u>
OUTPOL	Selects pollutants whose EF results are to be printed.
OUTLAP	Echoes the user-supplied values for the fields of the local area parameters (LAP) record.

Block Data Modules

<u>Module</u>	<u>Purpose</u>
BLOCK DATA 01	Initializes the speed correction factor (SCF) coefficients for vehicle types LDGV, LDGT1/2, and MC.
BLOCK DATA 02	Initializes the last years of the MYGs used for SCF coefficients, variables and arrays used in the calculation of the SCF, the high speed CO SCF parameters, and the speed and optional features CF array.
BLOCK DATA 03	Initializes the MYGs (by their upper bounds) and associated parameters used to select and index the intercept and slope arrays for the basic FTP emission rate equations.
BLOCK DATA 04	Initializes the zero mile levels (ZMLs) and deterioration rates (DRs) (intercepts and slopes) of the base FTP exhaust ER equations.
BLOCK DATA 05	Initializes the non-tampered idle offsets and the ZMLs, DRs and MYGs of the idle exhaust emission rate equations.
BLOCK DATA 06	Initializes I/M credit percentages for HC for Technologies I and II.
BLOCK DATA 07	Initializes I/M credit percentages for CO for Technologies I and II.
BLOCK DATA 08	Initializes the HC & CO annual inspection Tech IV + I/M credits array.
BLOCK DATA 09	Initializes the HC and CO biennial inspection Tech IV+ I/M credits array.
BLOCK DATA 10	Initializes methane offset values.
BLOCK DATA 11	Initializes the parameters and rates affecting both the hot soak & diurnal components of evaporative HC, or hot soak HC alone.

Block Data Modules

<u>Module</u>	<u>Purpose</u>
BLOCK DATA 12	Location not used.
BLOCK DATA 13	Initializes the parameter and rates of diurnal component of evaporative HC emissions.
BLOCK DATA 14	Initializes the average miles per day values and the coefficients of the trips per day equation.
BLOCK DATA 15	Initializes the crankcase component of evaporative HC emissions.
BLOCK DATA 16	Initializes miscellaneous integer-valued parameters.
BLOCK DATA 17	Initializes the temperature correction factor (TCF) coefficients and their MYGs, the computer TCF parameters, the TCF vector, and the cold start CO additive TCF offset parameters.
BLOCK DATA 18	Initializes the bag fraction coefficients used to compute the normalized operating mode and temperature CF for LDV/T and MC.
BLOCK DATA 19	Initializes the MYGs used for indexing BFRCOF and the mileage related parameters for the operating mode component of the operating mode and temperature CF algorithm.
BLOCK DATA 20	Initializes fleet characterization data: annual mileage accumulation rates, July 1 registration distributions, vehicle miles travelled mix, and registraton mix.
BLOCK DATA 21	Initializes the CFs for air conditioning usage, extra load, and trailer towing.
BLOCK DATA 22	Initializes the last years of the MYGs used for the air conditioning, extra load, and trailer towing Cs.
BLOCK DATA 23	Initializes the gasoline vs diesel sales fractions.

Block Data Modules

<u>Module</u>	<u>Purpose</u>
BLOCK DATA 24	Initializes character strings used in prompts and output formats and zeroes pointers into characters string arrays.
BLOCK DATA 25	Initializes the data and parameters used by the tampering code.
BLOCK DATA 26	Initializes by weight subclass and by relative model year the HDDV fleet characterization data (annual mileage accumulation rates and total new registrations).
BLOCK DATA 27	Documents common blocks that do not need to be initialized.
BLOCK DATA 28	Initializes the refueling loss HC emission factor parameters and data.
BLOCK DATA 29	Initializes the HDV grams per brake-horsepower hour to grams per mile conversation factors.
BLOCK DATA 30	Initializes the parameters for reading in, storing, and using the second required scenario record (local area parameters), plus fuel injection rates and MYGS.
BLOCK DATA 31	Initializes exhaust emission factor RVP CF calculation variables.
BLOCK DATA 32	Initializes I/M program parameters.
BLOCK DATA 33	Initializes the first required scenario record parameters and associated variables.
BLOCK DATA 34	Initializes running loss HC emissions data and parameters.

Appendix C

MOBILE4 SOURCE CODE LISTING

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```
1 C
2 C
3 C          ***** MOBILE4 *****
4 C
5 C
6 C MOBILE4 is the fourth version of the FORTRAN program implementation of the
7 C Mobile Source Emission Model. It updates and replaces MOBILE3. The model
8 C estimates HC, CO and NOx exhaust and HC evaporative emission factors by
9 C motor vehicles. For information on using the program and on the
10 C differences between MOBILE3 and MOBILE4, consult the User's Guide to
11 C MOBILE3, EPA 460/3-84-002, and the User's Guide to MOBILE4,
12 C EPA-AA-TEB-89-01. Otherwise questions should be directed to:
13 C
14 C      Office of Mobile Sources
15 C      Emission Control Technology Division
16 C      Test and Evaluation Branch
17 C      2565 Plymouth Road
18 C      Ann Arbor, Mich. 48105
19 C      Telephone: 313-668-4462
20 C                  FTS 374-8462
21 C
22 C
23 C Source Code Documentation
24 C -----
25 C
26 C The source code itself is commented to assist the users who require a
27 C more detailed understanding of the program than provided in the Guides.
28 C This section provides the following information:
29 C
30 C 1) Execution summary
31 C 2) Source code structure
32 C 3) Source code comments structure
33 C     a) Subroutines and functions header format
34 C     b) BLOCK DATA subprograms header format
35 C     c) In-line comments
36 C 4) Subscript dictionary
37 C 5) Subroutine / function parameter dictionary
38 C
39 C
40 C 1) Execution summary
41 C
42 C To run the program, attach the input file to logical I/O Unit 5 and the
43 C output file to Logical I/O Unit 6. If supplying optional alternate I/M
44 C credits, attach the credits file to Logical I/O Unit 4. Refer to the
45 C User's Guide to MOBILE4 for more detail on setting up runs and check
46 C your operating system documentation for the system commands for compiling
47 C and executing the program. There is discussion of running the program on
48 C the IBM PC AT under DOS in the User's Guide.
49 C
50 C For information on the source code itself, refer to the Programmer's Guide
51 C to MOBILE4, EPA-AA-TEB-89-01.
52 C
53 C
54 C 2) Source code structure
55 C
56 C This section describes the layout of the code plus the numbering and
57 C naming conventions.
58 C
```

117 C Each subprogram contains a documentation header, set up in a standard
 118 C format as described below. All variables and arrays used in the code
 119 C are defined in the comments. The subroutine / function headers define
 120 C local parameters and local variables / arrays. The BLOCK DATA headers
 121 C describe the COMMON storage areas. Array subscripts and subprogram
 122 C parameters are specified in dictionaries following this section. The
 123 C intent is to allow the user to scan the source code on-line for
 124 C definitions, rather than have to leaf through hard-copy documentation
 125 C such as the Programmer's Guide to MOBILE4.
 126 C

127 C a) Subroutines and functions header format

128 C
 129 C <subprogram name>
 130 C
 131 C <short description of purpose>
 132 C
 133 C Called by <subprogram name(s)>
 134 C
 135 C Calls <subprogram name(s)>
 136 C
 137 C Input on call:
 138 C
 139 C parameter list: <names>
 140 C common block(s):
 141 C /<cb name>/ <names>
 142 C . .
 143 C . .
 144 C
 145 C Output on return:
 146 C
 147 C parameter list: <names>
 148 C common block(s):
 149 C /<cb name>/ <names>
 150 C . .
 151 C . .
 152 C
 153 C Local array subscripts:
 154 C
 155 C <name>(<#>,...) - <name>(<name>,...)
 156 C . .
 157 C . .
 158 C
 159 C Local variable / array dictionary:
 160 C
 161 C Name Type Description
 162 C -----
 163 C <name> <type> <short description>
 164 C . . .
 165 C . . .
 166 C
 167 C Notes:
 168 C
 169 C <notes on subprogram, particularly changes from MOBILE3>
 170 C
 171 C
 172 C <code>
 173 C
 174 C Notes on format:

```

175 C
176 C
177 C   A local variable is one not passed in via the parameter list
178 C   or a common block. It can be used in the argument list of a
179 C   subprogram call made by the defining subprogram.
180 C
181 C   Also, if a section of the header is not needed, its format is
182 C   omitted. For example, if no subprograms are called, then the
183 C   'C Calls <names>' line is not included.
184 C
185 C   Finally, 'Output on return' includes any variable / array whose
186 C   contents can be modified by the subprogram. This usually will not
187 C   include data that can be changed by subprograms called by the
188 C   subprogram, since the comment headers on those subprograms will
189 C   indicate what is being passed back up.
190 C
191 C   b) BLOCK DATA subprogram header format
192 C
193 C       BLOCK DATA
194 C       C BLOCK DATA subprogram <#>
195 C       C
196 C       C <short description of data initialized in this BLOCK DATA>
197 C       C
198 C       C Common block array subscripts:
199 C       C
200 C       C <name>(<#>,...) - <name>(<name>,...)
201 C       C
202 C       C
203 C       C
204 C       C Common block dictionary:
205 C       C
206 C       C   Name      Type      Description
207 C       C   -----
208 C       C /<cb name>/:
209 C       C <name> <type>      <short description>
210 C       C
211 C       C
212 C       C
213 C       C Local array subscripts:
214 C       C
215 C       C <name>(<#>,...) - <name>(<name>,...)
216 C       C
217 C       C
218 C       C
219 C       C Local array dictionary:
220 C       C
221 C       C   Name      Type      Description
222 C       C   -----
223 C       C <name> <type>      <short description>
224 C       C
225 C       C
226 C       C
227 C       C COMMON /<name 1>/ ...
228 C       C
229 C       C
230 C       C
231 C       C
232 C       C DIMENSION (or type) <array 2>(subscript(s))

```



```

233 C      .
234 C      .
235 C      C
236 C      EQUIVALENCE (<array 1, subscripted>,<array 2, subscripted>)
237 C      .
238 C      .
239 C      .
240 C      C
241 C      C /<name 1>/: <any comments on <name 1>'s labels, purpose or data
242 C      C      or on the structure of the initializing DATA
243 C      C      statement(s)>
244 C      C
245 C      DATA <var/arr name 1>/<data>...

```

```

246 C      .
247 C      .
248 C      .
249 C      .../
250 C      C
251 C      C /<name 2>/: ...
252 C      .
253 C      .
254 C      .
255 C      END

```

```

256 C
257 C      Notes on format:
258 C

```

```

259 C      Local arrays are defined and then equivalenced to common block arrays
260 C      that are too large be initialized in 1 DATA statement. Too large =
261 C      would require greater than 19 continuation lines, the FORTRAN limit.
262 C

```

```

263 C      The local arrays dictionary is often compressed by providing a
264 C      generic definition of the conventions used to construct and name the
265 C      set of local arrays to be equivalenced to a given common array.
266 C

```

```

267 C      "<name #>/" prefix is included only if a large number of common
268 C      blocks are being initialized in a single BLOCK DATA (see BD 23).
269 C

```

```

270 C
271 C      c) In-line statements
272 C

```

```

273 C      In-line comments are intended to describe the algorithm being used
274 C      by the code. Where MOBILE4 is identical to MOBILE3 in operation,
275 C      the MOBILE3 comments have usually been left intact. Where the
276 C      method has been updated or the whole section / subprogram is new,
277 C      the in-line comments describe the MOBILE4 methodology.
278 C

```

```

279 C      Particular attention is paid to the use of indices and pointers.
280 C      Some of the ambiguities of MOBILE3, such as the use of IDX vs JDX,
281 C      have been cleared up. The usage of new keys and pointers is specified
282 C      in detail where they occur.
283 C      occur.
284 C

```

```

285 C
286 C      4) Subscript dictionary
287 C

```

```

288 C      Subscript variables used to index arrays in MOBILE4 are globally
289 C      defined, not in the sense that the values are available to all
290 C      subprograms, but rather that the same label is used for the same

```


Appendix C: MOBILE4 Program Description

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291 C subscript function throughout the code. IP is the 3 pollutants index
 292 C for all of MOBILE4, although its instances are usually as a local
 293 C variable. As array subscripts, all these variables must be of type
 294 C INTEGER. The default INTEGER typing syntax rule is employed by having
 295 C all subscripts begin with a letter from the range I through N.
 296 C

Name	Range	Description
IAD	1-5	index into ID dimension of ATR for ADJFAC equation
IADJ	1-2	index into CSIZE adjustment vector ADJFAC
IDUAF	1-2	index into diurnal adjustment vector TPDUAF 1=use FTP adjustment, 2=use In-Use adjustment
IAY	1-2	anti-tampering program start year flag: 1 = in year range up thru start year 2 = in year range after start year
IB	1-3	bag number: 1 = cold start 2 = hot stabilized 3 = hot start
IBER	1-3	terms of user supplied new emission rate equation: 1 = zero mile level (intercept) 2 = deterioration rate (slope) 3 = deterioration rate (slope), LDGV 81+ HC/CO 50K+
IC	1-7	overlap effects categories computed direct from base tamper rates; each case is the set intersection of the indicated disablement types: 1 = AorE * CATS 2 = AorE * NCKS 3 = AorE * TNKS 4 = AIRS * CATS * NCKS 5 = AIRS * CATS * TNKS 6 = CATS * NCKS 7 = CATS * TNKS AorE = AIRS if HC or CO = EGRS if NOx
	8-12	no overlap effects categories computed from the 7 overlap cases: 8 = AIRS 9 = CATS 10 = NCKS 11 = TNKS 12 = <no tampering effect>
ICAT	1-3	catalyst technology configurations: 1 = ox catalyst / no catalyst 2 = 3 way catalyst 3 = 3 way + ox catalyst
ICER	1-2	RVP parameter showing factors adjusted for 1 = non-certification factors only 2 = all factors, including certification fuel RVP

348 C

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349	C			
350	C	ICH	1-20	character string array position index:
351	C			1 = 1st 4/8 characters (CHARACTER*4/8)
352	C			2 = 2nd 4/8 characters
353	C			.
354	C			.
355	C			
356	C	ICDEF2	1-6	coefficient number of 2nd degree polynomial
357	C			(0th (intercept) to 2nd degree term coefficients)
358	C			
359	C	ICDEF5	1-6	coefficient number of 5th degree polynomial
360	C			(0th (intercept) to 5th degree term coefficients)
361	C			
362	C	ICOL	1-3	index into EFF's column dimension (BD 24 defines abbrs):
363	C			1 = PREV CAT ; 2 = PREV ; 3 = SUBS
364	C			
365	C	ICR	1-2	Replace I/M credits inclusion vector NUDATA's array
366	C			identifier subscript:
367	C			1 = (CR12HC & CR12CO) - Technologies 1-2
368	C			2 = CRED4V - Technologies 4+ LDGV
369	C			
370	C	ICS	1-NT	secondary index: selects pointers to category
371	C			sizes to be summed up to get SUB (in C8T011) and
372	C			DIV (in A8T011)
373	C			
374	C	IC11	1-11	positive tampering effects categories 1-11; 12 is the
375	C			no effects case.
376	C			
377	C	IC7	1-7	overlap tampering effects categories 1-7
378	C			
379	C	ID	1-9	disablement types (1-5,9 for bag, 6-8 for evap):
380	C			1 = AIRS = air pump disabled
381	C			2 = CATS = catalyst removed
382	C			3 = NCKS = misfueled - filler neck
383	C			4 = TNKS = misfueled - tank (all but filler neck)
384	C			5 = EGRS = EGR disabled
385	C			6 = EVAP = evaporative system tampered - cannister only
386	C			7 = PCVS = PCV disabled
387	C			8 = CAPS = evaporative system tampered - cannister and
388	C			gas (fuel inlet) cap
389	C			9 = MISF = misfueled - all sources = NCKS + TNKS
390	C			
391	C	IDBAG	1-5	bag exhaust disablement types (see ID)
392	C			
393	C	IDUSER	1-8	ID cases & order of cases presented to user in TAMFLG
394	C			(TAMZML & TAMDR) & ATPFLG (DISTYP) options. IDUSER
395	C			differs as follows: 4 = MISF. GETTAM derives TNKS =
396	C			MISF - NCKS for TAMDR & TAMZML and stores the read and
397	C			computed values in ID order. ATPAER does not need TNKS
398	C			& uses DISTYP in the read in IDUSER order.
399	C			
400	C	IDX	1-20	model year (my) window index:
401	C			1 = 20+ my age group cell => tamper effect is
402	C			always 0.0 => this case skipped in TAMPER (only)
403	C			2 = 19th my cell
404	C			3 = 18th my cell
405	C			.
406	C			.

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407 C
 408 C 19 = 2nd my cell
 409 C 20 = 1st my cell = calendar year (ICY)
 410 C
 411 C IEG 1-7 tampering effects group:
 412 C 1 = air pump disabled, air pump only equipped
 413 C 2 = air pump disabled, air pump/catalyst equipped
 414 C 3 = catalyst removed
 415 C 4 = misfueled catalyst
 416 C 5 = EGR disabled
 417 C 6 = EGR disabled / catalyst removed
 418 C 7 = EGR disabled / misfueled
 419 C
 420 C IEK 1-3 catalyst emission effects groups: IEK = IEG - 1
 421 C
 422 C IELST 4-7 last non-zero tampering effects group size, given IPG
 423 C
 424 C IEQU 1-20 pointer to idle equation to be zeroed out due to entry
 425 C of new exhaust ef equation by user
 426 C
 427 C IERNEW 1-20 pointer to location in default ef rates & model years
 428 C arrays where new ef equation's parameters are to be
 429 C stored (IERNEW = 0 => no space for new equation)
 430 C
 431 C IETH 1-2 NAMETH index: 1 = 'eth', 2 = 'meth' prefixes
 432 C
 433 C IEVEQ 1-8 HS and DU equation term coefficient - see definitions
 434 C for HSEQ in BD 09 and DUEQ in BD 11
 435 C
 436 C IEVP 1-4 index for gram evap rates EVP, GREVP and VGREVP:
 437 C 1=hot soak
 438 C 2=in-use diurnal
 439 C 3=multiple diurnal
 440 C 4=crankcase
 441 C
 442 C IEVX 1-32 model year (my) window index for evaporative data input,
 443 C i.e. to the IEVXth myg's rate(s) for a given N<> set
 444 C
 445 C IE1ST 1-3 first non-zero tampering effects group size, given IPG
 446 C
 447 C IFAC 1-100 index into new (user supplied) emission rates arrays;
 448 C the user can enter up to 100 replacement cases.
 449 C
 450 C IFDS 1-3 fuel delivery system type:
 451 C 1 = carbureted 2 = fuel injected OR
 452 C 1 = CARbureted 2 = TBI 3 = PFI
 453 C
 454 C IFG 1-13 flag names for prompts (listed by common block used):
 455 C /FLAGS1/ /FLAGS2/ /FLAGS3/ /FLAGS4/
 456 C 1 = TAMFLG 4 = MYMRFG 8 = ATPFLG 12 = PRTFLG
 457 C 2 = SPDFLG 5 = NEWFLG 9 = TEMFLG 13 = IDLFLG
 458 C 3 = VMFLAG 6 = IMFLAG 10 = RLFLAG 14 = NMHFLG
 459 C 7 = ALHFLG 11 = OUTFMT 15 = HCFLAG
 460 C The 14th flag (or 0 = PROMPT) is read without a prompt.
 461 C
 462 C IFL 1-2 myg bounds: 1 = First year 2 = Last year
 463 C
 464 C IFUEL 1-2 fuel type category for RVP exhaust effects:

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465	C			1 = gasoline & methanol 2 = ethanol
466	C			
467	C	IG<i>	1-20	model year group (myg) pointer:
468	C			<i> = null string, C, CAT, D, E, F, L, LM, S, T, U, W, 1, 2, 3, 4
469	C			IG links a data array to its corresponding myg index
470	C			array. These data arrays all have my as a subscript
471	C			plus have cases of contiguous subsets of years with
472	C			the same data point. Core space is then saved by
473	C			storing each point only once per my subset and then
474	C			constructing an index array to enable the program to
475	C			find the location IG<i> of the data point for a given
476	C			my.
477	C			
478	C	IGCSF	1-2	model year group index in the array CSF1ST:
479	C			1 = pre-1981 model years
480	C			2 = 1981+ model years
481	C			
482	C	IGER	1-20	myg pointer into basic emission rate arrays from IERPTR
483	C			
484	C	IGIDL	1-15	myg pointer into idle emission rate arrays from IDLPTR
485	C			
486	C	IG50	1-12	myg pointer into the 50K+ deterioration rate arrays
487	C			ERB50K & ERU50K (the arrays differ in lookup algorithm)
488	C			
489	C	IGTL	1-5	running loss HC: emission rate MYG pointer
490	C			
491	C	IH	1-3	non-exhaust HC emission case:
492	C			1 = hot soak evaporative
493	C			2 = diurnal evaporative
494	C			3 = crankcase
495	C			
496	C	IHG	1-2	non-exhaust HC technology / tampering case:
497	C			1 = evaporative
498	C			2 = crankcase
499	C			
500	C	IHDSAL	1-2	HDGV sales fraction case
501	C			1 = HDGV weighing < 14000 lbs
502	C			2 = HDGV weighing >= 14000 lbs
503	C			
504	C	IHRD	1-6	evaporative temperature types:
505	C			1 = hot soak
506	C			2 = running loss
507	C			3 = diurnal, 8 AM
508	C			4 = diurnal, 10-11 AM
509	C			5 = diurnal, 2 PM
510	C			6 = diurnal, daily
511	C			
512	C	ILU	1-2	bounds of a value range (ex.: tags of nonzero
513	C			category sizes):
514	C			1 = lower bound
515	C			2 = upper bound
516	C			
517	C	IM	1-2	I/M program flag:
518	C			1 = I/M program not in effect for MY x IV x ICY case
519	C			1 = I/M program is in effect for MY x IV x ICY case
520	C			
521	C	IMDL	1-2	coefficients for trips per day model equation:
522	C			1 = intercept

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523	C		2 = slope
524	C		
525	C	INO	1-2 index into NOYES character string vector:
526	C		1 = No 2 = Yes
527	C		
528	C	IP	1-3 pollutants:
529	C		1 = HC = hydrocarbon
530	C		2 = CO = carbon monoxide
531	C		3 = NOx = oxides of nitrogen
532	C		
533	C	IPAR	1-5 parameters identifying where and when to apply user
534	C		supplied new emission rates:
535	C		1 = region
536	C		2 = vehicle type 4 = first my of range covered
537	C		3 = pollutant 5 = last my of range covered
538	C		
539	C	IPG	1-2 pollutants grouped for tampering effects & SK2 scfs:
540	C		1 = HC and CO
541	C		2 = NOX
542	C		
543	C	IP1	1-3 lower bound of output IP loop (first pollutant to
544	C		have results printed)
545	C		
546	C	IP2	1-3 upper bound of output IP loop (last pollutant to
547	C		have results printed)
548	C		
549	C	IP50	1-2 pollutant types affected by 1981+ LDGV 50K+ change in
550	C		deterioration rate
551	C		
552	C	IQG	1-6 emission control equipment group; 2 more groups
553	C		computed from the stored 6 groups data:
554	C		1 = air pump only
555	C		2 = air pump / catalyst
556	C		3 = catalyst only
557	C		4 = EGR only
558	C		5 = EGR / 3-way catalyst
559	C		6 = no EGR / 3-way catalyst
560	C		
561	C	IR	1-2 region code:
562	C		IR has same value range as IREJN, but is not necessarily
563	C		the scenario field's value
564	C		1 = low altitude
565	C		2 = high altitude
566	C		
567	C	IROW	1-15 index into EFF's row dimension = the 8 ID cases split
568	C		into 15 subcases (see BD 24 definition of EFF)
569	C		
570	C	IRT	1-4 temperature cases in RVP cf calculations, the values
571	C		referenced depending on the (sub)array. See /RVPEX1/.
572	C		
573	C	IRQ1	1-3 RVP cf equation parameters set 1 (RVP > 9.0 adj.):
574	C		RADJCF=(b1+b2*RVP)/b3
575	C		
576	C	IRQ2	1-2 RVP cf equation parameters set 2 (T interpolation)
577	C		1 = initial temperature (T range 1b)
578	C		2 = temperature difference (interval length)
579	C		
580	C	IRQ3	1-3 RVP & high T combined cf formula coefficients:

Appendix C: MOBILE4 Program Description

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```

581 C          TCF (IB)=EXP (a1*(RVP-9)+a2*(T-75)+a3*(RVP-9)*(T-75))
582 C
583 C      IRVP      1-2/4  types of non-certification RVP: 1 = Base, 2 = In-use
584 C                  3 = Uncontrolled refueling loss
585 C                  4 = Hot soak (weathered)
586 C
587 C      IS        1-4    overlap tampering effects category sizes 8-11
588 C                  ( IS = IC - 7 ); used in A8T011.
589 C
590 C      ISC        1-5    underscore string repetition counter - for example,
591 C                  ISC = 3 => repeat the string 3 times
592 C
593 C      ISP        1-21   my group pointer into speed correction equation array;
594 C                  found by ISPPTR; indexes SK1 & SCUNA1.
595 C
596 C      IS2a       1-2/3  number of coefficients in a new scf equation:
597 C                  IS2C = 2 (A/X+B); IS2N = 3 (A+B*X+C*X**2)
598 C
599 C      IT         1-9    pointer to temperature correction equation
600 C                  coefficients; found by ITCPTR; indexes TTA/4/7COF
601 C                  arrays.
602 C
603 C      ITECH<a>  1-15    emission control technology class wrt I/M impact;
604 C                  f(MY,IVLD) as determined by IMPTR; indexes I/M credits
605 C                  arrays CR12HC/CO & CRD4VA/B. ITECHA/B/C are in BD8&34.
606 C
607 C      ITEM       1-2    NAMTEM index: 1 = 'mini', 2 = 'maxi' prefixes
608 C
609 C      ITER       1-4    unspecified string iterations counter; same usage as
610 C                  ISC, only with any string
611 C
612 C      ITL        1-13   running loss HC: defined trip lengths for 3 cycle types:
613 C                  1-6 - NYCC      7-12 - LA-4      13 - HFET
614 C
615 C      ITLR       1-4    running loss HC: RVPs at which measured r1 HC available
616 C
617 C      ITLT       1-4    running loss HC: temperatures at which measured r1 HC
618 C                  emission rates are available
619 C
620 C      ITY        1-3    type tampering rates wrt I/MxIGD table heading substring
621 C                  pointer
622 C
623 C      IUDI       1-5    index into Uncontrolled Diurnal rate UDI:
624 C                  1 = standard FTP conditions
625 C                  2 = in-use conditions
626 C                  3 = 8AM-11AM conditions
627 C                  4 = 10AM-3PM conditions
628 C                  5 = 8AM-2PM conditions
629 C
630 C      IV         1-8    vehicle types evaluated by MOBILE4:
631 C                  1 = LDGV = light duty (ld) gasoline fueled vehicle
632 C                  2 = LDGT1 = ld gasoline fueled truck, <= 6000 lbs.
633 C                  3 = LDGT2 = ld gasoline fueled truck, 6001-8500 lbs.
634 C                  4 = HDGV = heavy duty gasoline fueled vehicle
635 C                  5 = LDDV = light duty diesel fueled vehicle
636 C                  6 = LDDT = light duty diesel fueled truck
637 C                  7 = HDDV = heavy duty diesel fueled vehicle
638 C                  8 = MC      = motorcycle

```

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```

639      C
640      C      IV<i>      1-6      vehicle type subgroups; index correction factor arrays;
641      C      <i> = LM, TEMP, A, B or LDG, defined as:
642      C      IVLM      IVTEMP      IVA      IVB      IVLDG
643      C      1 = LDGV      1 = LDGV      1 = LDGV      1 = HDGV      1 = LDGV
644      C      2 = LDGT1      2 = LDGT1      2 = LDGT1      2 = LDDV      2 = LDGT1
645      C      3 = LDGT2      3 = LDGT2      3 = LDGT2      3 = LDDT      3 = LDGT2
646      C      4 = LDDV      4 = HDGV      4 = MC      4 = HDDV
647      C      5 = LDDT      5 = MC
648      C      6 = MC
649      C      indexes:
650      C      MYGSP1      MYGTCT      SCADJ1      GPBSCO      TTFC
651      C      BFRCOF      ISPGRP
652      C      ALHRET
653      C      See subroutines BIGCFX & BIGALH and function ISPPTR.
654      C
655      C      IVEFF      1-2      vehicle class groupings for Stage II vrs percent
656      C      efficiency in reducing HC refueling losses:
657      C      1 = LDGV, LDGT1 & LDGT2      2 = HDGV
658      C
659      C      IVF1      1-6      vehicle class types for MOBILE1 numeric output
660      C      format (OUTFMT = 1):
661      C      1 = LDV      3 = LDT2      5 = HDD
662      C      2 = LDT1      4 = HDG      6 = MC
663      C
664      C      IVF2      1-9      vehicle class types for MOBILE2 numeric output
665      C      format (OUTFMT = 2):
666      C      1 = LDGV      4 = LDGT      7 = LDDT
667      C      2 = LDGT1      5 = HDGV      8 = HDDV
668      C      3 = LDGT2      6 = LDDV      9 = MC
669      C
670      C      IVF3      1-10      vehicle class types for MOBILE4 descriptive output
671      C      format (OUTFMT = 3): same as IVF2 plus 10 = All Vehicles
672      C
673      C      IVIM      1-4      vehicle class types that can be included in MOBILE4
674      C      inspection / maintenance (I/M) programs:
675      C      1 = LDGV      2 = LDGT1      3 = LDGT2      4 = HDGV
676      C
677      C      IVHD      1-2      vehicle class types for heavy duty only (used for
678      C      units conversion of user entered hd zml & dr):
679      C      1 = HDGV      2 = HDDV
680      C
681      C      IVP      1-3      vehicle types whose ef's can be modified by correction
682      C      factors for extra load, trailer towing &/or CO offset:
683      C      1 = LDGV      2 = LDGT1      3 = LDGT2
684      C
685      C      IVREV      1-4      vehicle types covered by the revised idle EF algorithm:
686      C      1 = LDGV      2 = LDGT1      3 = LDGT2      4 = HDGV (HC&CO)
687      C      IVI = IVREV, except 3 & 4 -> 3 (HDGV uses LDGT2 data)
688      C
689      C      IVTAM      1-4      vehicle types impacted by tampering:
690      C      1 = LDGV      2 = LDGT1      3 = LDGT2      4 = HDGV
691      C
692      C      IV9      1-9      vehicle type categories for output arrays EFEVAP,
693      C      EFIDLE, & EFFTP. First 8 are identical to IV's.
694      C      9 = LDGT
695      C      = LDGT1 + LDGT2, each weighted by its vmt share
696      C

```

Appendix C: MOBILE4 Program Description

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697	C	I2ND	1-4	secondary index (pointer into a pointer vector)
698	C			
699	C	JCS	1-7	pointer to category size to be summed into DIV
700	C			(in A8T011) or (* TGSUSE) into EGS (in SETEGS)
701	C			
702	C	JDX	10-1	model year window index = age of vehicle relative to
703	C			ICY + 1. In detail:
704	C			20 = 20+ my age group cell => tamper effect is
705	C			always 0.0 => this case skipped in TAMPER (only)
706	C			19 = 19th my cell
707	C			18 = 18th my cell
708	C			.
709	C			.
710	C			.
711	C			2 = 2nd my cell
712	C			1 = 1st my cell = calendar year (ICY)
713	C			
714	C	JG	1-20	model year group pointer = IG or 21 - IG, depending on
715	C			whether looking for match or unused cell, respectively,
716	C			in MYGERB. Also used (as is KG) to distinguish (from IG)
717	C			myg dimension size differences in BD comments.
718	C			
719	C	JOU	1-3	output unit key:
720	C			cell 1 is assigned IOUREP's value
721	C			cell 2 is assigned IOUERR's value
722	C			cell 3 is assigned IOUASK's value
723	C			
724	C	JPGD	1,5	pointer to base tamper rate to be used in
725	C			computing CSIZE(1-3, IAY). Depends on IPG.
726	C			
727	C	JSTD	1-6	emissions standard model year group for gas fueled IV.
728	C			The group key is the same as ISTD, but JSTD is set
729	C			internally, instead of being passed in via EVMAIN.
730	C			(The ISTD definition is in the Parameter Dictionary.)
731	C			
732	C	JU	1-9	input / output (i/o) device unit numbers
733	C			
734	C	JV	1-2	vapor pressure calculation loop & vectors index (CALUDI)
735	C			
736	C	KSTD	1-2	mapping of JSTD used to index R2ALT:
737	C			KSTD = 1, unless JSTD = 4 -> KSTD = 2
738	C			
739	C	KDX	1-21	model year window index = ICY - 1979, unless result is
740	C			< 1 (=> = 1) or > 21 (=> = 21); used by HDDMYM
741	C			
742	C	LAY	1-2	same as IAY, but set for DISCAL call only.
743	C			
744	C	LIM	1-2	= IM, except = 1 when there is an I/M kink, but it is
745	C			after LDXSY & the PREV segment is being evaluated:
746	C			
747	C			
748	C			
749	C			
750	C			
751	C			
752	C			
753	C			
754	C	LIMIT	1-2	index for range check on a variable's value assignment:

IM	IMKINK	LKINK	LIM	Comments
1	1	1	1	P & S: no I/M
2	1	1	2	P & S: all I/M
2	2	1	1	P: no I/M; S: kinked I/M
2	2	2	2	P: kinked I/M; S: all I/M

Appendix C: MOBILE4 Program Description

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755 C 1 = lower bound 2 = upper bound

756 C

757 C LINES 1-9 number of lines in user entered data set title

758 C

759 C LJDX 20-1 model year relative to LAPSY = JDX - LDXSY + 1;

760 C used with CUMMIL to get mileage of "previous" segment

761 C

762 C LKINK 1-2 same as LMKINK, except LMDXSY must be within (JDX,LDXSY)

763 C

764 C NCKIAY 1-3 index into ECK = ICOL index

765 C

766 C

767 C

768 C 5) Subroutine / function parameter dictionary

769 C

770 C Variables /arrays occurring in 1 or more of the subprogram parameter

771 C lists are defined in this section, unless the variable is a subscript,

772 C in which case look it up in 4)'s subscript dictionary. The motivation

773 C for defining all the parameter lists in one place is to have only one

774 C instance of a definition in the code plus to encourage only one use

775 C for a mnemonic in the code plus the combined lists contain only 18

776 C names after subscripts have been removed. Whether scanning on-line or

777 C off a listing, the lookup will be quick.

778 C

779 C Parameter array subscripts

780 C -----

781 C CSFUSE (7) - CSFUSE (IC7)

782 C CSFIST (7,2,2) - CSFIST (IC7, IPG, IGCSF)

783 C S2LEFT (4) - S2LEFT (IVTAM)

784 C

Name	Type	Description
CSFUSE	R	category size factors used * ATR to calculate CSIZE
CSFIST	R	category size factor for 1st calculation of CSIZE
FLGERR	I	number of flag values found to be out of range
IBEFWS	1-2	switch identifying routine calling BEF & result returned 1 = BEFIDL = return uncorrected basic ef 2 = EFCALX or HCCALX = return basic ef corrected for operating mode, temperature, RVP (if high temp), I/M and tampering
ICASE	I	flags the my groups array to be searched.
ICY	I	calendar year for which emission factors are calculated
INERR	I	cumulative count of data entry errors
IOUOUT	I	unit number on which title is printed
IOUSUM	I	sum of acceptable changed i/o unit numbers
IVALUE	I	entered integer value causing error / warning message
IY	I	year to test and adjust to 4-digit year
IY1	I	lower 4-digit bound for IY
IY2	I	upper 4-digit bound for IY
MESSAG	I	message code sent by calling subprogram
MY	I	model year
NERR	I	number of error if IY is out of bounds
RVALUE	R	entered real value causing error / warning message
S2LEFT	R	See local dictionary definition in REFUEL header.
VMDGT	R	sum of vmt for LDGT1 and LDGT2 (= X23 in MOBILE2)
VMTAGE	R	vehicle cumulative mileage

811 C

812 C Evap Study II Parameter List Dictionary for CCEVRT block of routines:

Appendix C: MOBILE4 Program Description

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813	C			
814	C	Name	Range	Description
815	C	-----	-----	-----
816	C	EVRATE	R	dependent variable value from evaporative component
817	C			equation(s) calculation:
818	C			KEYEVP EVRATE
819	C			1 => hot soak rate
820	C			2 => diurnal rate
821	C			
822	C	ISTD	1-7	emissions standard model year group for gas fueled IV:
823	C			IVGAS value myg
824	C			-----
825	C			1 1 pre-1971
826	C			2 1971
827	C			3 1972-1977
828	C			4 1978-1980
829	C			5 1981+ carbureted (KEYEQ=1 or 2) OR
830	C			cert fuel chg, carbureted (KEYEQ=3)
831	C			6 1981+ TBI KEYEQ=1 or 2 OR
832	C			cert fuel chg, TBI KEYEQ=3
833	C			7 1981+ PFI KEYEQ=1 or 2 OR
834	C			cert fuel chg, PFI KEYEQ=3
835	C		2	1 pre-1971
836	C			2 1971
837	C			3 1972-1977
838	C			4 1978-1980
839	C			5 1981+ carbureted (KEYEQ=1 or 2) OR
840	C			cert fuel chg, carbureted (KEYEQ=3)
841	C			6 1981+ TBI KEYEQ=1 or 2 OR
842	C			cert fuel chg, TBI KEYEQ=3
843	C			7 1981+ PFI KEYEQ=1 or 2 OR
844	C			cert fuel chg, PFI KEYEQ=3
845	C		3	1 pre-1979
846	C			2 1979-1980
847	C			3 1981+ carbureted (KEYEQ=1 or 2) OR
848	C			cert fuel chg, carbureted (KEYEQ=3)
849	C			4 1981+ TBI KEYEQ=1 or 2 OR
850	C			cert fuel chg, TBI KEYEQ=3
851	C			5 1981+ PFI KEYEQ=1 or 2 OR
852	C			cert fuel chg, PFI KEYEQ=3
853	C		4	1 pre-1985
854	C			2 1985+ (KEYEQ=1 or 2) OR
855	C			cert fuel chg, carbureted (KEYEQ=3)
856	C		5	1 pre-1978
857	C			2 1978-1979
858	C			3 1980-81
859	C			4 1982-84
860	C			5 1985+
861	C			
862	C	IVGAS	1-5	gasoline fueled vehicle types (= IVTEMP):
863	C			1 = LDGV 2 = LDGT1 3 = LDGT2 4 = HDGV 5 = MC
864	C			IVGAS = IV, except MC (5 vs 8); IVEVAP is an alt name.
865	C			
866	C	IVTL	1-4	running loss HC: vehicle classes with r1 HC emissions
867	C			
868	C	KEYEQ	1-3	HS/DU equation group selection key:
869	C			1 = untampered
870	C			2 = uncontrolled

Appendix C: MOBILE4 Program Description

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```
871 C          3 = certification fuel change
872 C
873 C      KEYEVP    1-2    Evaporative component calculation selection key
874 C                  1 = hot soak  2 = diurnal
875 C
876 C      RIVAL     R      independent variable value in evaporative component
877 C                  equation(s) calculation:
878 C                  KEYEVP          RIVAL
879 C                  1    => hot soak => fuel RVP
880 C                  2    => diurnal  => diurnal Index
881 C
882 C *****
883 C
884 C      IC, IDX, IFDS, IG, IM, IP, IP1, IP2, IR, IV and JSTD are parameters
885 C      defined in the subscript dictionary.
886 C
887 C
```

Appendix C: MOBILE4 Program MAIN

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```

1000 C MAIN
1001 C
1002 C MAIN is the MOBILE4 driver. It sets up the run and then loops through
1003 C scenarios.
1004 C
1005 C Calls CONSEC, EFCALX, ONESEC, OUTDT5, OUTNEW, OUTPUT, PARSEC and REGMOD.
1006 C
1007 C Since MAIN is not "called" and does not "return", the I/O interface
1008 C documentation will list the variables passed in argument lists or common
1009 C blocks and used in MAIN:
1010 C
1011 C     argument lists: ICY,INERR
1012 C     common blocks:
1013 C     /FLAGS3/ OUTFMT
1014 C     /IOUCOM/ IOUERR
1015 C     /REGION/ IREJN
1016 C
1017 C Local variable dictionary:
1018 C
1019 C     Name      Type      Description
1020 C     -----
1021 C     ICYOLD    I         calendar year from previous pass of scenario loop
1022 C     IROLD     I         region from previous pass of scenario loop
1023 C     LEAST1    I         flag: 0 = OUTPUT has not yet been called.
1024 C                     1 = OUTPUT has been called at least 1 time.
1025 C
1026 C Notes:
1027 C
1028 C MAIN was modified for MOBILE4, updating several common block declarations.
1029 C MAIN was modified for MOBILE4, updating several common block declarations.
1030 C
1031 C
1032 C     CHARACTER*8 NAMFLG,NAMMMR
1033 C     CHARACTER*8 USNAME
1034 C     CHARACTER*4 NAMRVP,NAMETH,NAMTEM
1035 C     CHARACTER*4 NOYES,COMMA,PERIOD
1036 C     CHARACTER*4 IMNAME,PROJID,SCNAME
1037 C     CHARACTER*1 ASTMCL,ACCLASS
1038 C     CHARACTER*1 COLON
1039 C     INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
1040 C     INTEGER ALHFLG
1041 C     INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
1042 C     INTEGER PRTFLG,HCFLAG
1043 C     INTEGER ATPPGM,ATPFQT,DISTYP
1044 C     REAL JULMYR,JANMYR
1045 C     REAL LHDVM,MHDVM,HHDVM,LHDRG,MHDRG,HHDRG
1046 C
1047 C     COMMON /ALUHAC/ ACEQIP(8,3,2),ACCF(2,3,2,3,2)
1048 C     COMMON /ALUHIN/ AC,XLOAD(3),TRAILR(3),ABSHUM,DB,WB
1049 C     COMMON /ALUHLT/ XLCF(3,6,3,2),TWCF(3,6,3,2)
1050 C     COMMON /ALUOUT/ ALHRET(20,4,3)
1051 C     COMMON /ALUPAC/ MYGACE(8,3,2),MYGACC(2,3,2)
1052 C     COMMON /ALUPLT/ MYGXLC(6,3,2),MYGTWC(6,3,2)
1053 C     COMMON /ATPAR1/ LAPSY,LAP1ST,LAPLST,LVTFLG(4)
1054 C     COMMON /ATPAR2/ ATPPGM,ATPFQT,CRATP,DISTYP(8)
1055 C     COMMON /ATPAR3/ AIR(2),CAT(2),ECK(3),TNK(2),EGR(2)
1056 C     COMMON /ATPAR4/ CAN(2),PCV(2),CAP(2),EFF(2,3,15)
1057 C     COMMON /BASEQ1/ ERBZML(20,3,8,2),ERBDR(20,3,8,2),ERB50K(12,2,2)

```

Appendix C: MOBILE4 Program MAIN

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```

1058 COMMON /BASEQ2/ MYGERB (20,3,8,2),MAXERB
1059 COMMON /BASEQ3/ NEWVEH,NEWMYF,NEWMYL,ZMLNEW,DRNEW,KINKS
1060 COMMON /BASEQ4/NEWPAR (5,100),BERNEW (3,100),NEWFIT (100),NEWCT,MAXCT
1061 COMMON /BASEQ5/ ERUZML (12,3,8,2),ERUDR (12,3,8,2),ERU50K (12,2,2)
1062 COMMON /BASEQ6/ MYGERU (12,2,3,8,2),MAXERU,NUMERU (3,8,2),KEYER,IGER
1063 COMMON /BASEQ7/ IPMOD (3)
1064 COMMON /CEVCOM/ USRTPD (8),USRMPD (8)
1065 COMMON /CEVBYM/ BMYMPD (20,8),BMYTPD (20,8)
1066 COMMON /CITCIN/ UDI (5),IUDI,CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW
1067 COMMON /CITPAR/ SCNAME (4),FRETH,FRMETH,FRGAS
1068 COMMON /CITRV1/ RVPBAS,RVPIUS,RVPAST,RVPICY,RVPETH,IUSESY,RATUNC
1069 COMMON /CITRV2/ RVPHS1,RVPHS2,RVPET1,RVPET2,RVPO90,RVP100,RVP115
1070 COMMON /CITRV3/ RVPMP (5),RVPX (2,2),ICLASS,ASTMCL,ACLASS (5)
1071 COMMON /CITUSE/ RVUSE1,RVUSE2,CIUSE1,CIUSE2
1072 COMMON /CRACOM/ MAXCRA,CRAVAL (3,8,2),MYGCRA (3,8,2)
1073 COMMON /CUMCOM/ CUMMIL (20,8)
1074 COMMON /EGSCAL/ AER (11,11,2,2),TGS (11,6,4),EGS (7,2),OPENLP (20,4)
1075 COMMON /EMECAL/ EM3W (3,3,3),EMOX (3,3,3),EMEGR (4,3,3),EMI (7,3,3)
1076 COMMON /EVADU1/ DUEQ (3,2,10),EFDU (4,2),HDDU (2),CLDU (5,2),TPDU (8,2)
1077 COMMON /EVADU2/ HIDU (2),DULIM (3,2),R2DU (2,2),TPDUAF (7,4,2),IDUAF
1078 COMMON /EVAHIA/ HIHS (2),HIADJ1,HIADJ2
1079 COMMON /EVAHS1/ HSEQ (3,2,12),EFHS (4,2),HDHS (2),CLHS (5,2)
1080 COMMON /EVAHS2/ TPHS (7,4,2)
1081 COMMON /EVAPAR/ IFDS,ISTDC,ISTDT,ISTDP,FINJ (2)
1082 COMMON /EVAPGR/ EVP (4),GREVP (4,9),VGREVP (4)
1083 COMMON /EVAPHD/ HDSAL,HDWGT (2),IVVMP (5)
1084 COMMON /EVASTD/ MYGSTD (5,5),MAXSTD,KSTD81 (4,3)
1085 COMMON /EVPDAT/ EVPAER (3,2),EVPTGS (3,2,4),CCEMI (7,4)
1086 COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
1087 COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
1088 COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
1089 COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
1090 COMMON /GSFCOM/ MAXGSF,GSFRAC (22,8,2),MYGSF (22,8,2)
1091 COMMON /HDCCOM/ HDCFAC (37,2),LOWYR,MAXCIG
1092 COMMON /HDDMAR/ C2BDVM (20),LHDVM (20),MHDVM (20),HHDVM (20)
1093 COMMON /HDDREG/ C2BDRG (21),LHDRG (21),MHDRG (21),HHDRG (21)
1094 COMMON /IDLEQ1/ ZMLIDL (15,3,8,2),DRIDL (15,3,8,2)
1095 COMMON /IDLEQ2/ MYGIDL (15,3,8,2),MAXIDL
1096 COMMON /IDLEQ3/ UTIDOF (14,3,2)
1097 COMMON /ICR4VA/ CRD4VA (19,2,12,3)
1098 COMMON /ICR4VB/ CRD4VB (19,2,12,3)
1099 COMMON /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER (2),CRIM
1100 COMMON /IMPAR2/ ILDT (4),ITEST,NUDATA (2),NONUDA,NLIM,IMNAME (20,9)
1101 COMMON /IMPAR3/ IMDX1,IMDX2,IMCASE,IMVEH,IM
1102 COMMON /IMPAR5/ MYGIM2 (3,3),LBIM4P,CRHDGV (2,2),DISCNT (3)
1103 COMMON /IMPAR6/ IFREQ,INTYP
1104 COMMON /IM12HC/ CR12HC (19,20,5,2)
1105 COMMON /IM12CO/ CR12CO (19,20,5,2)
1106 COMMON /INJECT/ TBI (13,4),PFI (13,4),MAXFIY,MINFIY
1107 COMMON /IOUCOM/ IOUIDM,IOUGEN,IOUREP,IOUERR,IOUASK
1108 COMMON /IVPCOM/ IVPTRL (8),IVPTRT (8),IVPTRA (8),IVPTRB (8)
1109 COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
1110 COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
1111 COMMON /MPDCOM/ MAXMPD,VALMPD (2,8),MYGMPD (2,8)
1112 COMMON /MYCODE/ MY,IDX,JDX,LDSY,LMYRV,IAI,IMDSY,IMKINK
1113 COMMON /MYRCAL/ XMYM (20,8),JANMYR (20,8),TF (20,8),TFMYM (20,8)
1114 COMMON /MYRSAV/ AMAR (20,8),JULMYR (20,8),NEWCOM
1115 COMMON /MYUB1/ MYTGS (11,6,4),MYEGR (4,4),MYVTS (3,2,4)

```

Appendix C: MOBILE4 Program MAIN

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```

1116 COMMON /MYUB2/ MYCCE1 (7,4)
1117 COMMON /NAMES1/ NAMFLG (16), NAMMMR (2,2,8), NAMRVP (4)
1118 COMMON /NAMES2/ NAMETH (2), NAMTEM (2)
1119 COMMON /NMETH1/ EXMET1 (3,6,8,2), MYGEXM (6,8,2), EXMET2 (3,10,3), LBEXM
1120 COMMON /NMETH2/ IEXMYG, IEXARR
1121 COMMON /OFFSET/ OFFCO (20,3), OFFMTH (20,8)
1122 COMMON /OMTCOM/ OMTCF (20,3,8), OMTTAM (20,3,4)
1123 COMMON /OPMOD1/ BFRCOF (8,8,3,6), BFSTEP (8,12,3,3), BFR50K (4,12,3)
1124 COMMON /OPMOD2/ MYSTEP, MAXBFR, MYGBFR (8,3,6)
1125 COMMON /OPMOD3/ BFMILE, KINKBF, BFGT50
1126 COMMON /PROJEC/ PROJID (20)
1127 COMMON /QUITXQ/ N1QUIT
1128 COMMON /REGION/ FEET (2), IREJN, ALT, INITPR
1129 COMMON /REGISF/ GSFVCT (8)
1130 COMMON /RESUL1/ EFFTP (3,9), EFEXH (9), EFEVAP (9), EFLOSS (9), EFRUNL (9)
1131 COMMON /RESUL2/ EFIDLE (3,9)
1132 COMMON /RESUL3/ VFTP (3), VEXH, VEVAP, VLOSS, VRUNLS, VIDLE (3)
1133 COMMON /RLCOM1/ ROADFE (32,4), DISPL, SPILL, OBED, OBES, OBDL (4)
1134 COMMON /RLCOM2/ IOBMY, IOVB (4), IS2SY, NPHASE, S2EFF (4)
1135 COMMON /RLCOM3/ RLRATE (20,4)
1136 COMMON /RUNLS1/ TLVMT (13), TLEMI (13,4,4,4,4), MAXTL
1137 COMMON /RUNLS2/ TLCAN (13,4,4), TLCAP (13,4,4)
1138 COMMON /RUNLS3/ RULBAS (4,4,4,4), RULCAN (4,4), RULCAP (4,4)
1139 COMMON /RUNLS4/ MYGRUL (4,4), MAXRUL
1140 COMMON /RUNLS5/ RULRVP (4), RULTEM (4)
1141 COMMON /RVPEX1/ R9G1 (3,2), RG23 (3,3,3,2), TLL (2)
1142 COMMON /RVPEX2/ MYGRVP (4,4), RVPCF (20,3,4,2), OPENCR
1143 COMMON /RVPNAT/ ICERSY, RVPCEP, RVPLIM (2), RVPDIU (2), PFUL, EINCR
1144 COMMON /SCENE1/ SPD (8), PCCN, PCHC, PCCC
1145 COMMON /SCENE2/ FCC, FCN, FHC, FHN
1146 COMMON /SPEED1/ SK1 (6,18,3), SK2C (2,14,2,3), SKG (2,6,2), SK2N (3,14,3)
1147 COMMON /SPEED2/ MYGSP1 (18,2,3), MYGSMC (18,2,3), MYGSP2 (3,3)
1148 COMMON /SPEED3/ SADJ, SCUNA1 (18,3,8), SCADJ1 (3,4), ISGRP (3,4)
1149 COMMON /SPEED4/ MAXSP1, LBISTS (3), LBLAST, IVB, IVA
1150 COMMON /SPEED5/ MYHSPC (2,3), MAXHSP (3)
1151 COMMON /SPEED6/ SALHCF (20,3,8)
1152 COMMON /SPEED7/ GPBSCO (3,3,4)
1153 COMMON /SIZCAL/ ATR (5,2), TGSUSE, CSIZE (12,2), CSAE (12)
1154 COMMON /SIZPAR/ NTERMS (4), INDXCS (5,4)
1155 COMMON /STRING/ NOYES (2), COMMA, PERIOD, COLON
1156 COMMON /TAMEQ1/ TAMZML (9,4,2,2), TAMDR (9,4,3,2), MYGTAM (4), IGT5, F50K
1157 COMMON /TAMEQ2/ BTR (9,2)
1158 COMMON /TAMEQ3/ CUMALL, CUMNIM, CUMIM, GT50KA, GT50KN, GT50KI
1159 COMMON /TAMID1/ EM13W (3,3,3), EMIOX (3,3,3), EMIDL (3,4,3)
1160 COMMON /TAMID2/ MYIDLE (3,3), IEK
1161 COMMON /TAMID3/ OFFIDL (3,20,4)
1162 COMMON /TAMOUT/ TAMBAG (3,3,20,4), THS (2,20,4), TDU (20,4), TCC (20,4)
1163 COMMON /TAMOU2/ TOB (20,4), GCONLY (20,4)
1164 COMMON /TEMPC1/ TTFC (2,3,9,3), TTFD (3,3,3), TT4 (2,6,3), TT8 (2,3,4,3)
1165 COMMON /TEMPC2/ MAXTCF, MYGTCF (9,3,5), MYGTFD (3), ISHIFT
1166 COMMON /TEMPC3/ MDLOH1 (3), TDIFF (3), CHFRAC (3), TCFF (3,2), TCF (3)
1167 COMMON /TEMPC4/ MYGCOO (3), LOWCO, COOTFC (3), COOTFD (3)
1168 COMMON /TEMPS/ AMBT, TEMMIN, TEMMAX, TEMEXH (3), TEMEV (6), TEMAST (3)
1169 COMMON /TPDCOM/ TPDCO (2,8)
1170 COMMON /USDATA/ USNAME (4,4), NUSD, IUSD (4)
1171 COMMON /VMXCOM/ REGMIX (8), TFNORM (8), VMTMIX (8)
1172 COMMON /YEARS4/ IY1941, IY1960, IY2020
1173

```


Appendix C: MOBILE4 Program MAIN

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```

1174 C Initialize MAIN level variables.
1175 C
1176     INERR=0
1177     ICYOLD=-1
1178     IROLD=-1
1179     LEAST1=0
1180 C
1181 C Control and One-Time Data Sections:
1182 C
1183 C Get the execution control flags and parameters, and then use them to read
1184 C in data, if any, that is read in once and applied to all scenarios. Note:
1185 C alternate RETURN1 is the fatal read error exit: execution stops.
1186 C
1187     CALL CONSEC(*99)
1188     CALL ONESEC(INERR,*99)
1189 C
1190 C Enter scenario loop.
1191 C
1192 C Note that if INERR > 0 coming out of CONSEC/ONESEC, then the scenarios will
1193 C be read and processed, but EFCALX/OUTPUT will not be called. The user will
1194 C only get error diagnostics out of the run.
1195 C
1196     10 CALL PARSEC(ICY,INERR,*98)
1197 C
1198 C 50+ errors is (arbitrary) run limit => stop execution. Otherwise,
1199 C one or more input processing errors => abort current scenario & then do
1200 C input processing for error diagnostics on the remaining scenarios. INERR
1201 C is never reset to 0, but instead accumulates until the run ends or the
1202 C cutoff value (50) is reached.
1203 C
1204     IF (INERR.GT.50) GOTO 20
1205     IF (INERR.GT.0) GOTO 10
1206 C
1207     IF (ICYOLD.NE.ICY.OR.IROLD.NE.IREJN) CALL REGMOD(ICY,INERR)
1208     IF (INERR.GT.50) GOTO 20
1209     IF (INERR.GT.0) GOTO 10
1210     ICYOLD=ICY
1211     IROLD=IREJN
1212 C
1213     CALL EFCALX(ICY,INERR)
1214     IF (INERR.GT.50) GOTO 20
1215     IF (INERR.GT.0) GOTO 10
1216 C
1217     CALL OUTPUT(ICY)
1218     LEAST1=1
1219     GOTO 10
1220 C
1221     20 CALL QUITER(0.0,0,28,INERR)
1222 C
1223 C If user is supplying replacement basic FTP of parameter records, always
1224 C print the records contents and disposition table, even when input errors
1225 C have prevented the normal output routines from being called. The only
1226 C exception is when a READ error / end-of-file occurs in CONSEC or ONESEC.
1227 C
1228 C This section can be expanded to print other optional input.
1229 C
1230     98 IF (LEAST1.EQ.0.AND.NEWFLG.EQ.2) CALL OUTNEW
1231 C

```


Appendix C: MOBILE4 Program MAIN

May 5, 1989

1232

99 STOP

1233

END

Appendix C: MOBILE4 Subroutine QUITER

May 5, 1989

```

2000 SUBROUTINE QUITER(RVALUE,IVALUE,MESSAG,INERR)
2001 C
2002 C QUITER prints error and warning messages on unit IOUERR.
2003 C
2004 C Called by CALUDI, CONSEC, CRANKC, DIURNL, EFCALX, EXMPTR, GETATP,
2005 C GETERQ, GETIMP, GETMRN, GETNAT, GETTAM, GETVMT,
2006 C HCCALX, HOTSOK, IDLCAL, IDLPTR, IERPTR, IEVPTR, ITAMPT,
2007 C IGEPTR, IGLPTR, IBFPTR, IGSFPT, IGTPT, IGUPTR, ISPPTR,
2008 C ITCPTR, LOCAL, OLDTPD, PARSEC, RDCITY, STOERQ,
2009 C TFCALX and YRTEST.
2010 C
2011 C Input on call:
2012 C
2013 C parameter list: RVALUE,IVALUE,MESSAG,INERR
2014 C common blocks:
2015 C /ATPAR2/ ATPPGM,ATPFQT,CRATP
2016 C /BASEQ4/ NEWPAR,MAXCT
2017 C /BASEQ6/ MAXERU
2018 C /CITRV3/ ASTMCL
2019 C /IMPAR6/ IFREQ,INTYP
2020 C /IOUCOM/ IOUREP,IOUERR,IOUASK
2021 C /NAMES1/ NAMFLG,NAMRVP
2022 C /NAMES2/ NAMETH,NAMTEM
2023 C /QUITXQ/ NIQUIT
2024 C /YEARS4/ IY1941,IY1960,IY2020
2025 C
2026 C Output on return:
2027 C
2028 C parameter list: INERR
2029 C
2030 C Warning: there is a conditional branch to STOP at statement number 198.
2031 C
2032 C Local array subscripts:
2033 C
2034 C IOOFBD(5) - IOOFBD ( ICH )
2035 C NAMEFF(2) - NAMEFF ( IVEFF )
2036 C NAMFNC(17) - NAMFNC ( ICH )
2037 C NAMFRQ(2) - NAMFRQ ( ATPFQT )
2038 C NAMTYP(2,3) - NAMTYP ( IMATP, ATPPGM )
2039 C NAMVEH(8) - NAMVEH ( IV )
2040 C
2041 C Local variable / array dictionary:
2042 C
2043 C Name Type Description
2044 C -----
2045 C IOOFBD C*4 character string vector: 'out of bounds for'
2046 C MAXMES I maximum message code value
2047 C MCODE I = MESSAG = message code, unless < 0 or > MAXMES => = 88
2048 C MCOM C*7 message type = "Comment" prefix
2049 C MERR C*7 message type = "Error" prefix
2050 C MTYPE C*7 message type prefix, determined by MCODE
2051 C MWARN C*7 message type = "Warning" prefix
2052 C NAMEFF I character key for Stage II vrs % efficiency IV label
2053 C NAMFNC C*8 function names (to identify subprogram source of error)
2054 C NAMFRQ C*8 I/M program inspection frequency cases
2055 C NAMTMP C*13 temperature names
2056 C NAMTYP C*8 I/M program type cases
2057 C NAMVEH C*8 vehicle type names

```

Appendix C: MOBILE4 Subroutine QUITER

May 5, 1989

```

2058 C
2059 C Notes:
2060 C
2061 C QUITER was modified in MOBILE4 to print message number.
2062 C QUITER was modified for MOBILE4 for AER/EVPAER internal generation.
2063 C QUITER was modified in MOBILE4 to print new I/M program parameter warnings.
2064 C and calculated temperature errors.
2065 C
2066 C Message slots available as of 02/28/89: none
2067 C
2068 C
2069 CHARACTER*8 NAMFLG,NAMMMR
2070 CHARACTER*4 NAMRVP,NAMETH,NAMTEM
2071 CHARACTER*1 ASTMCL,AClass
2072 C
2073 COMMON /ATPAR2/ ATPPGM,ATPFQT,CRATP,DISTYP(8)
2074 COMMON /BASEQ4/NEWPAR(5,100),BERNEW(3,100),NEWFIT(100),NEWCT,MAXCT
2075 COMMON /BASEQ6/ MYGERU(12,2,3,8,2),MAXERU,NUMERU(3,8,2),KEYER,IGER
2076 COMMON /CITRV3/ RVPXMAP(5),RVPX(2,2),IClass,ASTMCL,AClass(5)
2077 COMMON /IMPAR6/ IFREQ,INTYP
2078 COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
2079 COMMON /NAMES1/ NAMFLG(16),NAMMMR(2,2,8),NAMRVP(4)
2080 COMMON /NAMES2/ NAMETH(2),NAMTEM(2)
2081 COMMON /QUITXQ/ NIQUIT
2082 COMMON /YEARS4/ IY1941,IY1960,IY2020
2083 C
2084 INTEGER ATPFQT, ATPPGM
2085 C
2086 CHARACTER*1 NAMEFF(2)
2087 CHARACTER*4 IOOFBD(5)
2088 CHARACTER*8 MERR,MWARN,MCOM,MType
2089 CHARACTER*8 NAMVEH(8),NAMFNC(17)
2090 CHARACTER*8 NAMFRQ(2),NAMTYP(2,3)
2091 CHARACTER*13 NAMTMP(7)
2092 C
2093 DATA NAMEFF/'L','H'/
2094 C
2095 DATA IOOFBD/
2096 * ' ou','t of',' bou','nds ','for '/
2097 C
2098 DATA MERR/'Error: ',MWARN/'Warning: ',MCOM/'Comment: '/
2099 C
2100 DATA NAMVEH/
2101 * 'LDGV ',
2102 * 'LDGT1 ',
2103 * 'LDGT2 ',
2104 * 'HDGV ',
2105 * 'LDDV ',
2106 * 'LDDT ',
2107 * 'HDDV ',
2108 * 'MC '/
2109 C
2110 DATA NAMFNC/
2111 * 'IEVPTR ',
2112 * 'OLDTPD ',
2113 * 'not used',
2114 * 'not used',
2115 * 'CRANKC ',

```

Appendix C: MOBILE4 Subroutine QUITER

May 5, 1989

```

2116      * ' IGEPTR ',
2117      * ' IGUPTR ',
2118      * ' IGLPTR ',
2119      * ' IGTPTTR ',
2120      * ' IBFPTR ',
2121      * ' IERPTR ',
2122      * ' ISP C1 ',
2123      * ' ISP C2 ',
2124      * ' EXMPTR ',
2125      * ' ITCPTR ',
2126      * ' IGSFPT ',
2127      * ' IDLPTR '/
2128      C
2129      DATA NAMFRQ/'Annual ', 'Biennial'/
2130      C
2131      DATA NAMTMP/'ambient ',
2132      *          'exhaust ',
2133      *          'hot soak ',
2134      *          'running loss ',
2135      *          'diurnal 9 AM ',
2136      *          'diurnal 11 AM ',
2137      *          'diurnal 1 PM '/
2138      C
2139      DATA NAMTYP/'Central ', 'Central ',
2140      *          'Dec Comp', 'Decentr1',
2141      *          'Dec Man ', 'Decentr1'/
2142      C
2143      DATA MAXMES/111/
2144      C
2145      MCODE=MESSAG
2146      C
2147      C Trap unknown errors.
2148      C
2149      IF (MCODE.LT.1.OR.MCODE.GT.MAXMES) MCODE=88
2150      C
2151      C Double space if this is first call to QUITER on current run.
2152      C
2153      IF (N1QUIT.EQ.1) WRITE (10UERR,300)
2154      300 FORMAT('0',' ')
2155      IF (N1QUIT.EQ.1) N1QUIT=0
2156      C
2157      C Identify type of message.
2158      C
2159      MTYPE=MERR
2160      IF (MCODE.EQ.21.OR.MCODE.EQ.22.OR.MCODE.EQ.31.OR.MCODE.EQ.49
2161      *   .OR.MCODE.EQ.52.OR.MCODE.EQ.58.OR.MCODE.EQ.59.OR.MCODE.EQ.90
2162      *   .OR.MCODE.EQ.96.OR.MCODE.EQ.98.OR.MCODE.EQ.102.OR.MCODE.EQ.108
2163      *   .OR.MCODE.EQ.109.OR.MCODE.EQ.110) MTYPE=MWARN
2164      IF (MCODE.EQ.53.OR.MCODE.EQ.56.OR.MCODE.EQ.71.OR.MCODE.EQ.83)
2165      *   MTYPE=MCOM
2166      C
2167      C Write message type prefix:
2168      C
2169      WRITE (10UERR,302) MCODE,MTYPE
2170      302 FORMAT('-',T2,'M',I3,1X,A8)
2171      C
2172      C Branch to the appropriate error / warning / comment message.
2173      C

```

Appendix C: MOBILE4 Subroutine QUITER

May 5, 1989

```

2174      GOTO(
2175      *      11, 11, 11, 11, 11, 11, 11, 11, 11, 11,
2176      *      11, 11, 11, 11, 11, 11, 17, 18, 19, 20,
2177      *      21, 22, 23, 24, 25, 26, 27, 28, 29, 30,
2178      *      31, 32, 33, 34, 35, 36, 37, 38, 39, 40,
2179      *      41, 42, 43, 44, 45, 46, 47, 48, 49, 50,
2180      *      51, 52, 53, 54, 55, 56, 57, 58, 59, 60,
2181      *      61, 62, 63, 64, 65, 66, 67, 68, 69, 70,
2182      *      71, 72, 73, 74, 75, 76, 77, 78, 79, 80,
2183      *      81, 82, 83, 84, 85, 86, 87, 88, 89, 90,
2184      *      91, 92, 93, 94, 95, 96, 97, 98, 99, 100,
2185      *      101, 102, 103, 104, 105, 106, 107, 108, 109, 110,
2186      *      111 ),MCODE
2187
2188      C
2189      11 WRITE(10UERR,311) IVALUE,100FBD,NAMFLG(MCODE)
2190      311 FORMAT('+',12X,14,5A4,'flag',A8)
2191      GOTO 198
2192      17 WRITE(10UERR,317) RVALUE,100FBD
2193      317 FORMAT('+',12X,G10.3,5A4,'VMTMIX (0. to 1.)')
2194      GOTO 198
2195      18 WRITE(10UERR,318) RVALUE
2196      318 FORMAT('+',12X,G10.3,' sum of VMTMIX is not equal to 1.')
2197      GOTO 198
2198      19 WRITE(10UERR,319) RVALUE
2199      319 FORMAT('+',12X,G10.3,' negative model year mileage')
2200      GOTO 198
2201      20 WRITE(10UERR,320) RVALUE
2202      320 FORMAT('+',12X,G10.3,' negative model year registration')
2203      GOTO 198
2204      21 WRITE(10UERR,321) RVALUE
2205      321 FORMAT('+',14X,G10.3,' registration with zero mileage')
2206      GOTO 199
2207      22 WRITE(10UERR,322) RVALUE
2208      322 FORMAT('+',14X,G10.3,' mileage with zero registration')
2209      GOTO 199
2210      23 WRITE(10UERR,323) IVALUE,100FBD,MAXCT
2211      323 FORMAT('+',12X,14,5A4,'e.f. changes (1 to',14,' pairs)')
2212      GOTO 198
2213      24 WRITE(10UERR,324) IVALUE,100FBD
2214      324 FORMAT('+',12X,14,5A4,'region (1 to 2)')
2215      GOTO 198
2216      25 WRITE(10UERR,325) IVALUE,100FBD
2217      325 FORMAT('+',12X,14,5A4,'vehicle type (1 to 8)')
2218      GOTO 198
2219      26 WRITE(10UERR,326) IVALUE,100FBD
2220      326 FORMAT('+',12X,14,5A4,'pollutant (1 to 3)')
2221      GOTO 198
2222      27 WRITE(10UERR,327) IVALUE,100FBD,1Y1941,1Y2020
2223      327 FORMAT('+',12X,14,5A4,'year ('',14,' to '',14,'')')
2224      GOTO 198
2225      28 WRITE(10UERR,328)
2226      328 FORMAT('O',T2,'Excess data errors prevent further analysis.')
2227      GOTO 199
2228      29 WRITE(10UERR,329)
2229      329 FORMAT('+',12X,' last year cannot be less than first year')
2230      GOTO 198
2231      30 WRITE(10UERR,330) RVALUE
2232      330 FORMAT('+',12X,G10.3,' intercept must be positive')

```



```

2232      GOTO 198
2233      31 WRITE(10UERR,331) RVALUE
2234      331 FORMAT('+',14X,G10.3,' negative slope for ageing vehicle')
2235      GOTO 199
2236      32 WRITE(10UERR,327) IVALUE,100FBD,1Y1960,1Y2020
2237      GOTO 198
2238      33 WRITE(10UERR,333) IVALUE,100FBD
2239      333 FORMAT('+',12X,14,5A4,'stringency (10 to 50)')
2240      GOTO 198
2241      34 WRITE(10UERR,334) RVALUE,100FBD
2242      334 FORMAT('+',12X,F4.0,5A4,'1/M Program compliance rate',
2243      *      ' ', ' (0 to 100%)')
2244      GOTO 198
2245      35 WRITE(10UERR,335) IVALUE,100FBD,1Y1941,1Y2020
2246      335 FORMAT('+',12X,14,5A4,'MODYR1 (' ,14,' to ' ,14,')')
2247      GOTO 198
2248      36 WRITE(10UERR,336) IVALUE,100FBD,1Y1941,1Y2020
2249      336 FORMAT('+',12X,14,5A4,'MODYR2 (' ,14,' to ' ,14,')')
2250      GOTO 198
2251      37 WRITE(10UERR,337)
2252      337 FORMAT('+',12X,' MODYR1 cannot be greater than MODYR2')
2253      GOTO 198
2254      38 WRITE(10UERR,327) IVALUE,100FBD,1Y1960,1Y2020
2255      GOTO 198
2256      39 WRITE(10UERR,339) RVALUE
2257      339 FORMAT('+',12X,G10.3,' speed must be positive')
2258      GOTO 198
2259      40 WRITE(10UERR,340) RVALUE
2260      340 FORMAT('+',12X,G10.3,' valid ambient temperature',
2261      *      ' is 0-110 deg. (F)')
2262      GOTO 198
2263      41 WRITE(10UERR,341) RVALUE,100FBD
2264      341 FORMAT('+',12X,G10.3,5A4,'PCCN (0. to 100.)')
2265      GOTO 198
2266      42 WRITE(10UERR,342) RVALUE,100FBD
2267      342 FORMAT('+',12X,G10.3,5A4,'PCHC (0. to 100.)')
2268      GOTO 198
2269      43 WRITE(10UERR,343) RVALUE,100FBD
2270      343 FORMAT('+',12X,G10.3,5A4,'PCCC (0. to 100.)')
2271      GOTO 198
2272      44 WRITE(10UERR,344) RVALUE,100FBD
2273      344 FORMAT('+',12X,G10.3,5A4,'AC (0. to 1.)')
2274      GOTO 198
2275      45 WRITE(10UERR,345) RVALUE,100FBD
2276      345 FORMAT('+',12X,G10.3,5A4,'extra load (0. to 1.)')
2277      GOTO 198
2278      46 WRITE(10UERR,346) RVALUE,100FBD
2279      346 FORMAT('+',12X,G10.3,5A4,'trailers (0. to 1.)')
2280      GOTO 198
2281      47 WRITE(10UERR,347) RVALUE,100FBD
2282      347 FORMAT('+',12X,G10.3,5A4,'humidity (20. to 140.)')
2283      GOTO 198
2284      48 WRITE(10UERR,348) NAMVEH(IVALUE)
2285      348 FORMAT('+',12X,' there are no sales for vehicle ',A8)
2286      GOTO 198
2287      49 WRITE(10UERR,349) RVALUE
2288      349 FORMAT('+',14X,G10.3,' MYR sum not = 1. (will normalize)')
2289      GOTO 199

```

Appendix C: MOBILE4 Subroutine QUITER

May 5, 1989

```

2290      50 WRITE(10UERR,350) RVALUE,100FBD
2291      350 FORMAT('+',12X,G10.3,5A4,'tampering rate intercept (up to 1.0)')
2292      GOTO 198
2293      51 WRITE(10UERR,351) IVALUE,MAXERU
2294      351 FORMAT('+',12X,' equation',13,' can not be stored. Only',13,
2295      * ' equations'/' ',12X,' per pol/veh/reg case are allowed.'/
2296      * '0',' ')
2297      GOTO 198
2298      52 WRITE(10UERR,352) RVALUE
2299      352 FORMAT('+',14X,G10.3,' speed increased to 2.5 mph minimum')
2300      GOTO 199
2301      53 WRITE(10UERR,353)
2302      353 FORMAT('+',14X,' All flags must be corrected before rerunning.')
2303      GOTO 198
2304      54 WRITE(10UERR,354)
2305      354 FORMAT('-', 'End-of-file return on read of unit 10UIMD',
2306      * ' (new FTP 1/M credits). Run aborted.'/'0',' ')
2307      GOTO 198
2308      55 WRITE(10UERR,355)
2309      355 FORMAT('-', 'Error return on read of unit 10UIMD',
2310      * ' (new FTP 1/M credits). Run aborted.'/'0',' ')
2311      GOTO 198
2312      56 WRITE(10UERR,356)
2313      356 FORMAT('+',14X,' A/C correction factor will be calculated.'
2314      * '/',15,' Value of inputted AC usage parameter is ignored.')
2315      GOTO 199
2316      57 WRITE(10UERR,357)
2317      357 FORMAT('+',12X,'WB temp cannot be greater than DB temp')
2318      GOTO 198
2319      58 WRITE(10UERR,358) IVALUE,RVALUE
2320      358 FORMAT('+',14X,' Average miles/day is zero for vehicle class',12,
2321      * ' and model year',F6.0)
2322      GOTO 199
2323      59 WRITE(10UERR,359) IVALUE,(NEWPAR(IPAR,IVALUE),IPAR=1,3)
2324      359 FORMAT('+',14X,' equation',13,' zeroes all idle coefficients',
2325      * ' (and total) for IR=',11,', IV=',11,', IP=',11)
2326      GOTO 199
2327      60 WRITE(10UERR,360) INERR,NAMFNC(IVALUE)
2328      360 FORMAT('+',12X,14,' exceeds ub of highest myg in',A8)
2329      GOTO 198
2330      61 WRITE(10UERR,361) INERR,NAMFNC(IVALUE)
2331      361 FORMAT('+',12X,' default used for',15,' in index function',A8)
2332      GOTO 198
2333      62 WRITE(10UERR,362) IVALUE,100FBD
2334      362 FORMAT('+',12X,14,5A4,'new e.f. region (1 to 2)')
2335      GOTO 198
2336      63 WRITE(10UERR,363) RVALUE,100FBD
2337      363 FORMAT('+',12X,G10.3,5A4,' (0. <= PCHC+PCCC <= 100.)')
2338      GOTO 198
2339      64 WRITE(10UERR,364) RVALUE,100FBD
2340      364 FORMAT('+',12X,G10.3,5A4,' (0. <= PCHC+PCCC-PCCN <= 100.)')
2341      GOTO 198
2342      65 WRITE(10UERR,365) IVALUE
2343      365 FORMAT('+',12X,' MYR of LDDV not equal to LDGV for JDX=',12)
2344      GOTO 198
2345      66 WRITE(10UERR,366) IVALUE
2346      366 FORMAT('+',12X,' MYR of LDDT not equal to LDGT1 for JDX=',12)
2347      GOTO 198

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2348      67 WRITE(10UERR,367) NAMVEH(IVALUE)
2349      367 FORMAT('+',12X,' EFFTP>0. and GSF=0. for vehicle ',A8)
2350      GOTO 198
2351      68 WRITE(10UERR,368) NAMVEH(IVALUE)
2352      368 FORMAT('+',12X,' EFFTP<=0. and VMTMIX>0. for vehicle ',A8)
2353      GOTO 198
2354      69 WRITE(10UERR,369) NAMVEH(IVALUE)
2355      369 FORMAT('+',12X,' EFIDLE>0. and GSF=0. for vehicle ',A8)
2356      GOTO 198
2357      70 WRITE(10UERR,370) NAMVEH(IVALUE)
2358      370 FORMAT('+',12X,' EFIDLE<=0. and VMTMIX>0. for vehicle ',A8)
2359      GOTO 198
2360      71 WRITE(10UERR,371) IOUREP,10UERR,10UASK
2361      371 FORMAT('+',14X,' Current output unit numbers are',
2362      *      ' IOUREP=',11,' IOUERR=',11,' IOUASK=',11)
2363      GOTO 199
2364      72 WRITE(10UERR,372) IVALUE,100FBD
2365      372 FORMAT('+',12X,14,5A4,'1/M vehicle type (1 to 2)')
2366      GOTO 198
2367      73 WRITE(10UERR,373) IVALUE,100FBD
2368      373 FORMAT('+',12X,14,5A4,'short test type flag (1 to 3)')
2369      GOTO 198
2370      74 WRITE(10UERR,374) IVALUE,100FBD
2371      374 FORMAT('+',12X,14,5A4,'new 1/M data flag (1 to 2)')
2372      GOTO 198
2373      75 WRITE(10UERR,375) IVALUE,100FBD
2374      375 FORMAT('+',12X,14,5A4,'anti-tampering program start year')
2375      GOTO 198
2376      76 WRITE(10UERR,376) IVALUE,100FBD
2377      376 FORMAT('+',12X,14,5A4,'anti-tampering program 1st model year')
2378      GOTO 198
2379      77 WRITE(10UERR,377) IVALUE,100FBD
2380      377 FORMAT('+',12X,14,5A4,'anti-tampering program last model year')
2381      GOTO 198
2382      78 WRITE(10UERR,378) IVALUE,100FBD
2383      378 FORMAT('+',12X,14,5A4,'anti-tampering vehicle type (1 to 2)')
2384      GOTO 198
2385      79 WRITE(10UERR,379) RVALUE,100FBD
2386      379 FORMAT('+',12X,10,3,5A4,'evap ATP effectiveness rate (0. to 1.)')
2387      GOTO 198
2388      80 WRITE(10UERR,380) RVALUE,100FBD
2389      380 FORMAT('+',12X,10,3,5A4,'exh ATP effectiveness rate (0. to 1.)')
2390      GOTO 198
2391      81 WRITE(10UERR,381) RVALUE,100FBD
2392      381 FORMAT('+',12X,10,3,5A4,'AER matrix file column sum (0. to 1.)')
2393      GOTO 198
2394      82 WRITE(10UERR,382) IVALUE,100FBD
2395      382 FORMAT('+',12X,14,5A4,'type of 1/M inspection (1 (centralized ',
2396      *      'or 2 (computerized decentral) or 3 (manual decentral))')
2397      GOTO 198
2398      83 WRITE(10UERR,383)
2399      383 FORMAT(
2400      *      '+',14X,'One or more evaporative temperatures (input daily'/
2401      *      ' ',14X,'maximum, input ambient, calculated hot soak, and/or'/
2402      *      ' ',14X,'calculated running loss) is 40F or less, or input'/
2403      *      ' ',14X,'daily minimum is 25F or less; no evaporative emission'/
2404      *      ' ',14X,'factors (hot soak, diurnal, running loss, or refueling'/
2405      *      ' ',14X,'loss) will be calculated.')

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Appendix C: MOBILE4 Subroutine QUITER

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```

2406      GOTO 199
2407      84 WRITE(10UERR,384) IVALUE,100FBD
2408      384 FORMAT('+',12X,14,5A4,'onboard VRS vehicle class flag (1 to 2)')
2409      GOTO 198
2410      85 WRITE(10UERR,385) RVALUE,100FBD
2411      385 FORMAT('+',12X,10.3,5A4,'benzene fraction (0. to 1.)')
2412      GOTO 198
2413      86 WRITE(10UERR,386) IVALUE,100FBD
2414      386 FORMAT('+',12X,14,5A4,'no. of Stage II phase-in years (1 to 9)')
2415      GOTO 198
2416      87 WRITE(10UERR,387) IVALUE,100FBD
2417      387 FORMAT('+',12X,14,5A4,'vrs or rvp controls start year')
2418      GOTO 198
2419      88 WRITE(10UERR,388) MESSAG
2420      388 FORMAT('+',12X,' Message code ',14,' is unknown.')
2421      GOTO 198
2422      89 WRITE(10UERR,389) IVALUE,100FBD
2423      389 FORMAT('+',12X,14,5A4,' flag PROMPT (1 to 4)')
2424      GOTO 198
2425      90 WRITE(10UERR,390) NAMRVP(IVALUE),RVALUE
2426      390 FORMAT('+',14X,A4,' RVP reset to ',F4.1)
2427      GOTO 199
2428      91 WRITE(10UERR,391) RVALUE,100FBD,NAMTEM(IVALUE)
2429      391 FORMAT('+',12X,F10.1,5A4,A4,'mum daily temperature')
2430      GOTO 198
2431      92 WRITE(10UERR,392) RVALUE
2432      392 FORMAT('+',12X,' max daily temp =',F4.0,' < min daily temp')
2433      GOTO 198
2434      93 WRITE(10UERR,393) RVALUE,100FBD,NAMETH(IVALUE)
2435      393 FORMAT('+',12X,F10.2,5A4,A4,'anol fraction of local fuel supply')
2436      GOTO 198
2437      94 WRITE(10UERR,394) ASTMCL,100FBD
2438      394 FORMAT('+',12X,A1,5A4,'ASTM Volatility Class (A - E)')
2439      GOTO 198
2440      95 WRITE(10UERR,395) RVALUE
2441      395 FORMAT('+',12X,' ambient temp =',F4.0,' is < daily min temp',
2442      *      ' or > daily max temp')
2443      GOTO 198
2444      96 WRITE(10UERR,396) RVALUE
2445      396 FORMAT('+',14X,10.3,' speed reduced to 55 mph maximum')
2446      GOTO 199
2447      97 WRITE(10UERR,397) RVALUE,100FBD,IVALUE
2448      397 FORMAT('+',12X,F10.3,5A4,'Wade Index calc (CALUDI) of A, pass ',
2449      *      '11,': must be >= 0.0')
2450      GOTO 198
2451      98 WRITE(10UERR,398) RVALUE
2452      398 FORMAT (
2453      *+',14X,'Diurnal temperature rise (max temp-min temp=',F5.1,')'/
2454      *',14X,'is > 40F; diurnal evaporative emission factors will'/
2455      *',14X,'be calculated, but may be inaccurate.')
2456      GOTO 199
2457      99 WRITE(10UERR,399) RVALUE,100FBD,NAMEFF(IVALUE)
2458      399 FORMAT('+',12X,F5.0,5A4,'Stage II efficiency for ',A1,'DGV ',
2459      *      '(0 to 100 %)')
2460      GOTO 198
2461      100 WRITE(10UERR,400) RVALUE,100FBD
2462      400 FORMAT('+',12X,F3.0,5A4,'I/M Program waiver rate (0 to 50%)')
2463      GOTO 198

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Appendix C: MOBILE4 Subroutine QUITER

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2464      101 WRITE(10UERR,401) IVALUE,100FBD
2465      401 FORMAT('+',12X,14,5A4,'frequency of I/M inspection (1 (annual) ',
2466            *           'to 2 (biennial))')
2467            GOTO 198
2468      102 WRITE(10UERR,402)
2469      402 FORMAT('+',14X,' High altitude I/M scenario requires user to ',
2470            *           'supply high altitude values for Tech1&2 I/M credits arrays.')
2471            GOTO 199
2472      103 WRITE(10UERR,403) IVALUE,100FBD
2473      403 FORMAT('+',12X,14,5A4,'type of ATP program (1 (centralized) ',
2474            *           'to 2 (decentralized))')
2475            GOTO 198
2476      104 WRITE(10UERR,404) IVALUE,100FBD
2477      404 FORMAT('+',12X,14,5A4,'frequency of ATP inspection (1 (annual) ',
2478            *           'to 2 (biennial))')
2479            GOTO 198
2480      105 WRITE(10UERR,405) RVALUE,100FBD
2481      405 FORMAT('+',12X,F4.0,5A4,'ATP compliance rate must be'/
2482            *           ',36X,'in the range 0.% to 100.%, inclusive')
2483            GOTO 198
2484      106 WRITE(10UERR,406) IVALUE,100FBD
2485      406 FORMAT('+',12X,14,5A4,'ATP disablement inspections (1 (no) ',
2486            *           'to 2 (yes))')
2487            GOTO 198
2488      107 WRITE(10UERR,407)
2489      407 FORMAT('+',12X,' Error reading ATP program description',
2490            *           ' in the ONE-TIME data section')
2491            GOTO 198
2492      108 WRITE(10UERR,408) CRATP,RVALUE
2493      408 FORMAT('+',14X,' The ATP compliance rate of ',F5.1,' is not ',
2494            *           ' equal to the I/M compliance rate of ',F5.1)
2495            GOTO 199
2496      109 WRITE(10UERR,409) NAMFRQ(ATPFQT),NAMFRQ(1FREQ)
2497      409 FORMAT('+',14X,' The ATP inspection frequency is ',A8,
2498            *           ' and the I/M inspection frequency is ',A8)
2499            GOTO 199
2500      110 WRITE(10UERR,410) NAMTYP(2,ATPPGM),NAMTYP(1,INTYP)
2501      410 FORMAT('+',14X,' The ATP inspection type is ',A8,
2502            *           ' the I/M inspection type is ',A8)
2503            GOTO 199
2504      111 WRITE(10UERR,411) NAMTMP(IVALUE),RVALUE
2505      411 FORMAT('+',12X,' The calculated ',A13,'temperature',F6.1,
2506            *           ' is < daily min temp or > daily max temp')
2507
2508      C   Messages 60 and 61 produce excessive output if not stopped here. The other
2509      C   Cases stopping execution here are considered "fatal" errors: The user must
2510      C   fix the error-generating input and rerun.
2511      C
2512      198 IF (MCODE.EQ.53.OR.MCODE.EQ.60.OR.MCODE.EQ.61.OR.MCODE.EQ.82.OR.
2513            *   MCODE.EQ.88.OR.MCODE.EQ.89.OR.
2514            *   MCODE.EQ.97.OR.MCODE.EQ.107) STOP
2515            INERR=INERR+1
2516      C
2517      199 RETURN
2518      END

```



```

101000      SUBROUTINE CONSEC(*)
101001      C
101002      C CONSEC reads in and validates the Control Section flags. It also sets the
101003      C input mode for the run, resets the output units (if requested) and reads in
101004      C and stores the run title.
101005      C
101006      C Called by MAIN.
101007      C
101008      C Calls GETHOR, GETIOU, GETVER, MOD (FORTRAN library function), OUTHDR and
101009      C QUITER.
101010      C
101011      C Input on call:
101012      C
101013      C   common blocks:
101014      C   /IOUCOM/ IOUGEN, IOUREP, IOUASK
101015      C
101016      C Output on return:
101017      C
101018      C   common blocks:
101019      C   /FLAGS1/ PROMPT
101020      C   /PROJEC/ PROJID
101021      C
101022      C Local variable / array dictionary:
101023      C
101024      C   Name      Type      Description
101025      C   -----
101026      C   FLGERR    I         number of flag values found to be out of range
101027      C   INFORM    I         dummy variable: QUITER call purpose is to write out run
101028      C                   'inform'ation, not an error or a warning message
101029      C   IPRERR     I         PROMPT flag error code: 1 = in range (1-4) 2 = out of range
101030      C   VHMODE    I         decides prompt & read format for Control Section flags:
101031      C                   1 = vertical format      2 = horizontal format
101032      C
101033      C Notes:
101034      C
101035      C CONSEC was modularized for MOBILE4, creating GETIOU, GETVER & GETHOR.
101036      C
101037      C
101038      C   CHARACTER*4 PROJID
101039      C   INTEGER PROMPT, TAMFLG, SPDFLG, VMFLAG
101040      C
101041      C   COMMON /FLAGS1/ PROMPT, TAMFLG, SPDFLG, VMFLAG
101042      C   COMMON /IOUCOM/ IOUIMD, IOUGEN, IOUREP, IOUERR, IOUASK
101043      C   COMMON /PROJEC/ PROJID(20)
101044      C
101045      C   INTEGER FLGERR, VHMODE
101046      C
101047      C First pick up the I/O parameters (prompting or not, vertical or horizontal
101048      C control flag input, and alternate output units) and identify & assign (if
101049      C any) any allowable entered output units.
101050      C
101051      C   CALL GETIOU(IOUSUM,*99)
101052      C
101053      C Now parse prompt / input mode flag.
101054      C
101055      C Check if entered value is out of range. Skip parsing if it is.
101056      C
101057      IPRERR=1

```

```

101058      IF (PROMPT.LT.1.OR.PROMPT.GT.4) IPRERR=2
101059      IF (IPRERR.EQ.2) GOTO 10
101060      C
101061      C Parse prompt/mode flag.
101062      C
101063      VHMODE=1
101064      IF (PROMPT.GE.3) VHMODE=2
101065      PROMPT=MOD (PROMPT-1,2)+1
101066      C
101067      C Read title, even if PROMPT flag is out of range.
101068      C
101069      10 IF (PROMPT.EQ.2.OR.IPRERR.EQ.2) WRITE (IOUASK,200)
101070      200 FORMAT('1','Enter project id:')
101071      READ (IOUGEN,100,END=99) PROJID
101072      100 FORMAT(20A4)
101073      C
101074      C Write run title to each i/o unit (up to 3, depending on GETIOU's IOUCHG).
101075      C
101076      CALL OUTHDR (IOUREP)
101077      IF (IOUERR.NE.IOUREP) CALL OUTHDR (IOUERR)
101078      IF (PROMPT.EQ.2.AND.IOUASK.NE.IOUREP.AND.IOUASK.NE.IOUERR)
101079      * CALL OUTHDR (IOUASK)
101080      C
101081      C Display unit number values if changed.
101082      C
101083      IF (IOUSUM.GT.0) CALL QUITER (0.,0,71,INFORM)
101084      C
101085      C If PROMPT is out of range, tell user and stop run.
101086      C
101087      FLGERR=0
101088      IF (IPRERR.EQ.2) CALL QUITER (0.,PROMPT,89,FLGERR)
101089      C
101090      C Ready to read in flags in either vertical or horizontal mode.
101091      C
101092      IF (VHMODE.EQ.1) CALL GETVER (FLGERR,*99)
101093      IF (VHMODE.EQ.2) CALL GETHOR (FLGERR,*99)
101094      C
101095      C 1 or more flag values out of range => warn user & then stop run.
101096      C
101097      IF (FLGERR.GT.0) CALL QUITER (0.,0,53,FLGERR)
101098      RETURN
101099      C
101100      C EOF on any attempted read => take alternate return 1 => run aborts.
101101      C
101102      99 RETURN
101103      END

```

```

102000      SUBROUTINE GETIOU(IOUSUM,*)
102001      C
102002      C GETIOU reads in the prompt / mode flag and, if present, user supplied
102003      C output unit numbers for the run. GETIOU then identifies the numbers and
102004      C for each number determines if it can be used for the requested purpose and,
102005      C if so, assigns the number to the appropriate unit mnemonic.
102006      C
102007      C Called by CONSE.
102008      C
102009      C Input on call:
102010      C
102011      C   common blocks:
102012      C   /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
102013      C
102014      C Output on return:
102015      C
102016      C   common blocks:
102017      C   /FLAGS1/ PROMPT
102018      C   /IOUCOM/ IOUREP,IOUERR,IOUASK
102019      C
102020      C Local array subscripts:
102021      C
102022      C IOUCHG(9) - IOUCHG ( JU )
102023      C IOUNEW(3) - IOUNEW ( JOU )
102024      C IOUREF(9) - IOUREF ( JU )
102025      C
102026      C Local variable / array dictionary:
102027      C
102028      C   Name      Type      Description
102029      C   -----
102030      C IOUCHG    C*1      user entered changes to output unit assignments
102031      C IOUNEW    I        output unit numbers to be used this run
102032      C IOUREF    C*1      character representations of i/o unit numbers 1 - 9
102033      C IOUSUM    I        sum of acceptable changed i/o unit numbers **** MOVE TO (1,999)
102034      C
102035      C Notes:
102036      C
102037      C GETIOU was added for MOBILE4.
102038      C
102039      C
102040      C   INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
102041      C
102042      C   COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
102043      C   COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
102044      C
102045      C   CHARACTER*1 IOUREF(9),IOUCHG(3)
102046      C   DIMENSION IOUNEW(3)
102047      C
102048      C   DATA IOUREF/'1','2','3','4','5','6','7','8','9'/
102049      C
102050      C Read in prompt/mode flag and output unit changes (if any).
102051      C
102052      C   READ(IOUGEN,100,END=99) PROMPT,IOUCHG
102053      C   100 FORMAT(11,3A1)
102054      C
102055      C Output unit numbers parsed here.
102056      C
102057      C First set BLOCK DATA values as defaults, in case input number is rejected.

```

```
102058      C
102059      IOUNEW(1)=IOUREP
102060      IOUNEW(2)=IOUERR
102061      IOUNEW(3)=IOUASK
102062      C
102063      C Change alphanumeric to numeric values.
102064      C
102065      IOUSUM=0
102066      DO 30 JOU=1,3
102067      C
102068      C Test for allowed values (no input units).
102069      C
102070      DO 10 JU=1,9
102071      IF (JU.EQ.IOUIMD.OR.JU.EQ.IOUGEN) GOTO 10
102072      IF (IOUCHG(JOU).EQ.IOUREF(JU)) GOTO 20
102073      10 CONTINUE
102074      GOTO 30
102075      C
102076      C Save allowed new value.
102077      C
102078      20 IOUNEW(JOU)=JU
102079      IOUSUM=IOUSUM+JU
102080      30 CONTINUE
102081      C
102082      C Assign output units.
102083      C
102084      IOUREP=IOUNEW(1)
102085      IOUERR=IOUNEW(2)
102086      IOUASK=IOUNEW(3)
102087      C
102088      RETURN
102089      C
102090      C EOF on any attempted read => take alternate return 1 => run aborts.
102091      C
102092      99 RETURN1
102093      END
```

```

103000      SUBROUTINE GETVER (FLGERR,*)
103001      C
103002      C GETVER reads in and validates the Control Section flags via the vertical
103003      C input mode: one flag per input line in 11 format.
103004      C
103005      C Called by CONSEC.
103006      C
103007      C Calls QUITER.
103008      C
103009      C Input on call:
103010      C
103011      C   common blocks:
103012      C   /FLAGS1/ PROMPT
103013      C   /IOUCOM/ IOUGEN, IOUASK
103014      C   /NAMES1/ NAMFLG
103015      C   /STRING/ COLON
103016      C
103017      C Output on return:
103018      C
103019      C   parameter list: FLGERR
103020      C   common blocks:
103021      C   /FLAGS1/ TAMFLG, SPDFLG, VMFLAG
103022      C   /FLAGS2/ MYMRFG, NEWFLG, IMFLAG, ALHFLG
103023      C   /FLAGS3/ ATPFLG, RLFLAG, LOCFLG, TEMFLG, OUTFMT
103024      C   /FLAGS4/ PRTFLG, IDLFLG, NMHFLG, HCFLAG
103025      C
103026      C Notes:
103027      C
103028      C GETVER was added for MOBILE4.
103029      C GETVER was modified for MOBILE4, removed TPDFLG and added TEMFLG.
103030      C
103031      C
103032      C   CHARACTER*8 NAMFLG, NAMMMR
103033      C   CHARACTER*4 NAMRVP
103034      C   CHARACTER*4 NOYES, COMMA, PERIOD
103035      C   CHARACTER*1 COLON
103036      C
103037      C   INTEGER PROMPT, TAMFLG, SPDFLG, VMFLAG
103038      C   INTEGER ALHFLG
103039      C   INTEGER ATPFLG, TPDFLG, RLFLAG, TEMFLG, OUTFMT
103040      C   INTEGER PRTFLG, HCFLAG
103041      C
103042      C   COMMON /FLAGS1/ PROMPT, TAMFLG, SPDFLG, VMFLAG
103043      C   COMMON /FLAGS2/ MYMRFG, NEWFLG, IMFLAG, ALHFLG
103044      C   COMMON /FLAGS3/ ATPFLG, TPDFLG, RLFLAG, LOCFLG, TEMFLG, OUTFMT
103045      C   COMMON /FLAGS4/ PRTFLG, IDLFLG, NMHFLG, HCFLAG
103046      C   COMMON /IOUCOM/ IOUIMD, IOUGEN, IOUREP, IOUERR, IOUASK
103047      C   COMMON /NAMES1/ NAMFLG (16), NAMMMR (2,2,8), NAMRVP (4)
103048      C   COMMON /STRING/ NOYES (2), COMMA, PERIOD, COLON
103049      C
103050      C   INTEGER FLGERR
103051      C
103052      C Do the in-range check immediately after flag read, since if in interactive
103053      C mode (PROMPT.EQ.2), user can then receive out-of-range message immediately
103054      C after entering an erroneous flag value.
103055      C
103056      C   IF (PROMPT.EQ.2) WRITE (IOUASK,200) NAMFLG (1), COLON
103057      200 FORMAT (' ', 'Enter', T7, A8, T14, A1)

```



```

103058      READ(10UGEN,100,END=99) TAMFLG
103059 100  FORMAT(11)
103060      IF (TAMFLG.LT.1.OR.TAMFLG.GT.2) CALL QUITER(0.,TAMFLG,1,FLGERR)
103061 C
103062      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(2),COLON
103063      READ(10UGEN,100,END=99) SPDFLG
103064      IF (SPDFLG.LT.1.OR.SPDFLG.GT.2) CALL QUITER(0.,SPDFLG,2,FLGERR)
103065 C
103066      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(3),COLON
103067      READ(10UGEN,100,END=99) VMFLAG
103068      IF (VMFLAG.LT.1.OR.VMFLAG.GT.3) CALL QUITER(0.,VMFLAG,3,FLGERR)
103069 C
103070      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(4),COLON
103071      READ(10UGEN,100,END=99) MYMRFG
103072      IF (MYMRFG.LT.1.OR.MYMRFG.GT.4) CALL QUITER(0.,MYMRFG,4,FLGERR)
103073 C
103074      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(5),COLON
103075      READ(10UGEN,100,END=99) NEWFLG
103076      IF (NEWFLG.LT.1.OR.NEWFLG.GT.2) CALL QUITER(0.,NEWFLG,5,FLGERR)
103077 C
103078      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(6),COLON
103079      READ(10UGEN,100,END=99) IMFLAG
103080      IF (IMFLAG.LT.1.OR.IMFLAG.GT.2) CALL QUITER(0.,IMFLAG,6,FLGERR)
103081 C
103082      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(7),COLON
103083      READ(10UGEN,100,END=99) ALHFLG
103084      IF (ALHFLG.LT.1.OR.ALHFLG.GT.3) CALL QUITER(0.,ALHFLG,7,FLGERR)
103085 C
103086      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(8),COLON
103087      READ(10UGEN,100,END=99) ATPFLG
103088      IF (ATPFLG.LT.1.OR.ATPFLG.GT.2) CALL QUITER(0.,ATPFLG,8,FLGERR)
103089 C
103090      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(9),COLON
103091      READ(10UGEN,100,END=99) RLFLAG
103092      IF (RLFLAG.LT.1.OR.RLFLAG.GT.5) CALL QUITER(0.,RLFLAG,9,FLGERR)
103093 C
103094      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(10),COLON
103095      READ(10UGEN,100,END=99) LOCFLG
103096      IF (LOCFLG.LT.1.OR.LOCFLG.GT.2) CALL QUITER(0.,LOCFLG,10,FLGERR)
103097 C
103098      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(11),COLON
103099      READ(10UGEN,100,END=99) TEMFLG
103100      IF (TEMFLG.LT.1.OR.TEMFLG.GT.2) CALL QUITER(0.,TEMFLG,11,FLGERR)
103101 C
103102      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(12),COLON
103103      READ(10UGEN,100,END=99) OUTFMT
103104      IF (OUTFMT.LT.1.OR.OUTFMT.GT.4) CALL QUITER(0.,OUTFMT,12,FLGERR)
103105 C
103106      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(13),COLON
103107      READ(10UGEN,100,END=99) PRTFLG
103108      IF (PRTFLG.LT.1.OR.PRTFLG.GT.4) CALL QUITER(0.,PRTFLG,13,FLGERR)
103109 C
103110      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(14),COLON
103111      READ(10UGEN,100,END=99) IDLFLG
103112      IF (IDLFLG.LT.1.OR.IDLFLG.GT.2) CALL QUITER(0.,IDLFLG,14,FLGERR)
103113 C
103114      IF (PROMPT.EQ.2) WRITE(10UASK,200) NAMFLG(15),COLON
103115      READ(10UGEN,100,END=99) NMHFLG

```

Appendix C: MOBILE4 Subroutine GETVER

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```
103116      IF (NMHFLG.LT.1.OR.NMHFLG.GT.2) CALL QUITER(0.,NMHFLG,15,FLGERR)
103117      C
103118      IF (PROMPT.EQ.2) WRITE (IOUASK,200) NAMFLG(16),COLON
103119      READ (IOUGEN,100,END=99) HCFLAG
103120      IF (HCFLAG.LT.1.OR.HCFLAG.GT.3) CALL QUITER(0.,HCFLAG,16,FLGERR)
103121      C
103122      RETURN
103123      C
103124      C EOF on any attempted read => take alternate return 1 => run aborts.
103125      C
103126      99 RETURN1
103127      END
```

Appendix C: MOBILE4 Subroutine GETHOR

May 5, 1989

```

104000      SUBROUTINE GETHOR (FLGERR,*)
104001      C
104002      C GETHOR reads in and validates the Control Section flags via the horizontal
104003      C input mode: all flag values entered on a single line (11,1X,11,1X,...,11).
104004      C
104005      C Called by CONSEC.
104006      C
104007      C Calls QUITER.
104008      C
104009      C Input on call:
104010      C
104011      C   common blocks:
104012      C   /FLAGS1/  PROMPT
104013      C   /IOUCOM/  IOUGEN, IOUASK
104014      C
104015      C Output on return:
104016      C
104017      C   parameter list: FLGERR
104018      C   common blocks:
104019      C   /FLAGS1/  TAMFLG, SPDFLG, VMFLAG
104020      C   /FLAGS2/  MYMRFG, NEWFLG, IMFLAG, ALHFLG
104021      C   /FLAGS3/  ATPFLG, RLFLAG, LOCFLG, TEMFLG, OUTFMT
104022      C   /FLAGS4/  PRTFLG, IDLFLG, NMHFLG, HCFLAG
104023      C
104024      C Notes:
104025      C
104026      C GETHOR was added for MOBILE4.
104027      C
104028      C
104029      C   INTEGER PROMPT, TAMFLG, SPDFLG, VMFLAG
104030      C   INTEGER ALHFLG
104031      C   INTEGER ATPFLG, TPDFLG, RLFLAG, TEMFLG, OUTFMT
104032      C   INTEGER PRTFLG, HCFLAG
104033      C
104034      C   COMMON /FLAGS1/  PROMPT, TAMFLG, SPDFLG, VMFLAG
104035      C   COMMON /FLAGS2/  MYMRFG, NEWFLG, IMFLAG, ALHFLG
104036      C   COMMON /FLAGS3/  ATPFLG, TPDFLG, RLFLAG, LOCFLG, TEMFLG, OUTFMT
104037      C   COMMON /FLAGS4/  PRTFLG, IDLFLG, NMHFLG, HCFLAG
104038      C   COMMON /IOUCOM/  IOUIMD, IOUGEN, IOUREP, IOUERR, IOUASK
104039      C
104040      C   INTEGER FLGERR
104041      C
104042      C   IF (PROMPT.EQ.2) WRITE (IOUASK,200)
104043      200 FORMAT (' ', 'Enter TAMFLG, SPDFLG, VMFLAG, ',
104044      *          ' MYMRFG, NEWFLG, IMFLAG, ALHFLG, ',
104045      *          ' ATPFLG, RLFLAG, LOCFLG, TEMFLG, OUTFMT, ',
104046      *          ' PRTFLG, IDLFLG, NMHFLG & HCFLAG')
104047      C
104048      C   READ (IOUGEN,100,END=99)
104049      *          TAMFLG, SPDFLG, VMFLAG,
104050      *          MYMRFG, NEWFLG, IMFLAG, ALHFLG,
104051      *          ATPFLG, RLFLAG, LOCFLG, TEMFLG, OUTFMT,
104052      *          PRTFLG, IDLFLG, NMHFLG, HCFLAG
104053      100 FORMAT (11,16 (1X,11))
104054      C
104055      C   IF (TAMFLG.LT.1.OR.TAMFLG.GT.2) CALL QUITER (0.,TAMFLG,1,FLGERR)
104056      C   IF (SPDFLG.LT.1.OR.SPDFLG.GT.2) CALL QUITER (0.,SPDFLG,2,FLGERR)
104057      C   IF (VMFLAG.LT.1.OR.VMFLAG.GT.3) CALL QUITER (0.,VMFLAG,3,FLGERR)

```

Appendix C: MOBILE4 Subroutine GETHOR

May 5, 1989

```
104058 IF (MYMRFG.LT.1.OR.MYMRFG.GT.4) CALL QUITER (0.,MYMRFG,4,FLGERR)
104059 IF (NEWFLG.LT.1.OR.NEWFLG.GT.2) CALL QUITER (0.,NEWFLG,5,FLGERR)
104060 IF (IMFLAG.LT.1.OR.IMFLAG.GT.2) CALL QUITER (0.,IMFLAG,6,FLGERR)
104061 IF (ALHFLG.LT.1.OR.ALHFLG.GT.3) CALL QUITER (0.,ALHFLG,7,FLGERR)
104062 IF (ATPFLG.LT.1.OR.ATPFLG.GT.2) CALL QUITER (0.,ATPFLG,8,FLGERR)
104063 IF (RLFLAG.LT.1.OR.RLFLAG.GT.5) CALL QUITER (0.,RLFLAG,9,FLGERR)
104064 IF (LOCFLG.LT.1.OR.LOCFLG.GT.2) CALL QUITER (0.,LOCFLG,10,FLGERR)
104065 IF (TEMFLG.LT.1.OR.TEMFLG.GT.2) CALL QUITER (0.,TEMFLG,11,FLGERR)
104066 IF (OUTFMT.LT.1.OR.OUTFMT.GT.4) CALL QUITER (0.,OUTFMT,12,FLGERR)
104067 IF (PRTFLG.LT.1.OR.PRTFLG.GT.4) CALL QUITER (0.,PRTFLG,13,FLGERR)
104068 IF (IDLFLG.LT.1.OR.IDLFLG.GT.2) CALL QUITER (0.,IDLFLG,14,FLGERR)
104069 IF (NMHFLG.LT.1.OR.NMHFLG.GT.2) CALL QUITER (0.,NMHFLG,15,FLGERR)
104070 IF (HCFLAG.LT.1.OR.HCFLAG.GT.3) CALL QUITER (0.,HCFLAG,16,FLGERR)
104071 C
104072     RETURN
104073 C
104074 C EOF on any attempted read => take alternate return 1 => run aborts.
104075 C
104076 99 RETURN1
104077     END
```

```

105000      SUBROUTINE ONESEC(INERR,*)
105001      C
105002      C ONESEC checks if control flags indicate One-time Data. It then reads in,
105003      C validates, and stores the data.
105004      C
105005      C Called by MAIN.
105006      C
105007      C Calls CEVTPD, GETATP, GETERQ, GETIMP, GETMRN, GETNAT, GETTAM,
105008      C      GETVMT and RDCITY.
105009      C
105010      C Input on call:
105011      C
105012      C      parameter list: INERR
105013      C      common blocks:
105014      C      /FLAGS1/ TAMFLG,VMFLAG
105015      C      /FLAGS2/ NEWFLG,IMFLAG
105016      C      /FLAGS3/ ATPFLG,LOCFLG
105017      C      /FLAGS4/ PRTFLG
105018      C
105019      C Output on return:
105020      C
105021      C      parameter list: INERR
105022      C
105023      C Notes:
105024      C
105025      C ONESEC was modified for MOBILE4.
105026      C
105027      C
105028      C      INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
105029      C      INTEGER ALHFLG
105030      C      INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
105031      C      INTEGER PRTFLG,HCFLAG
105032      C
105033      C      COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
105034      C      COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
105035      C      COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
105036      C      COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
105037      C
105038      C Process flags in order read, thus look first for new tampering rates.
105039      C
105040      C      IF (TAMFLG.EQ.2) CALL GETTAM(INERR,*99)
105041      C
105042      C Check for user supplied vmt mix to be used for all scenarios of this run.
105043      C
105044      C      IF (VMFLAG.EQ.3) CALL GETVMT(INERR,*99)
105045      C
105046      C Optionally read in and screen model year mileage accrual rates and / or
105047      C registration distributions. In all cases, normalize the distributions.
105048      C
105049      C      CALL GETMRN(INERR,*99)
105050      C
105051      C If requested, read, screen and store emission factor modification data.
105052      C
105053      C      IF (NEWFLG.EQ.2) CALL GETERQ(INERR,*99)
105054      C
105055      C If IMFLAG=2, read in I/M Program parameters and, if requested, alternate
105056      C I/M Credits.
105057      C

```


Appendix C: MOBILE4 Subroutine ONESEC

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```
105058      IF (IMFLAG.EQ.2) CALL GETIMP(INERR,*99)
105059      C
105060      C Anti-tampering program => get parameters and effectiveness rates.
105061      C
105062      IF (ATPFLG.EQ.2) CALL GETATP(INERR)
105063      C
105064      C Assign trips per day / miles per day.
105065      C
105066      C
105067      C CEVTPD calculates trips per day by model year group. The
105068      C corresponding miles will be calculated in CEVMPD everytime REGMOD is
105069      C called.
105070      C
105071      CALL CEVTPD
105072      C
105073      C Get user's picks for various fuel related HC emission factor parameters.
105074      C These parameters apply nationwide. They do not vary with local conditions
105075      C and therefore are entered in One-Time Data instead of by scenario.
105076      C
105077      IF (PRTFLG.EQ.1.OR.PRTFLG.EQ.4) CALL GETNAT(INERR,*99)
105078      C
105079      C If the user asks for 1 local area parameters record to apply to all
105080      C scenarios on the run, read it in here.
105081      C
105082      IF (LOCFLG.EQ.2) CALL RDCITY(INERR,*99)
105083      C
105084      C Normal return: Either there are no one-time data errors (=> + no other
105085      C errors => evaluate scenarios) OR there are errors (=> check for errors,
105086      C but do not process the scenario(s) or + number of errors > 50 =>
105087      C terminate the run).
105088      C
105089      RETURN
105090      C
105091      C EOF on any attempted read => take alternate return 1 => run aborts.
105092      C
105093      99 RETURN
105094      END
```

```

106000      SUBROUTINE GETTAM(INERR,*)
106001      C
106002      C GETTAM reads in, validates and stores replacement tampering rates.
106003      C
106004      C Called by ONESEC.
106005      C
106006      C Calls QUITER.
106007      C
106008      C Input on call:
106009      C
106010      C     parameter list: INERR
106011      C     common blocks:
106012      C     /FLAGS1/ PROMPT
106013      C     /FLAGS2/ IMFLAG
106014      C     /IOUCOM/ IOUGEN,IOUASK
106015      C
106016      C Output on return:
106017      C
106018      C     parameter list: INERR
106019      C     common blocks:
106020      C     /TAMEQ1/ TAMZML,TAMDR
106021      C
106022      C Local variable / array dictionary:
106023      C
106024      C      Name      Type      Description
106025      C      -----
106026      C      ZEROML   R      user entered tampering zml to be checked: ZEROML <= 1.0
106027      C
106028      C Notes:
106029      C
106030      C GETTAM was added for MOBILE4.
106031      C GETTAM was modified for MOBILE4 to add the IGD dimension.
106032      C GETTAM was modified for MOBILE4 to add > 50K case to IGD (IGD = 3).
106033      C GETTAM was modified for MOBILE4 for the new misfueling algorithm.
106034      C
106035      C
106036      C      INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
106037      C      INTEGER ALHFLG
106038      C
106039      C      COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
106040      C      COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
106041      C      COMMON /IOUCOM/ IOUID,IOUGEN,IOUREP,IOUERR,IOUASK
106042      C      COMMON /TAMEQ1/ TAMZML(9,4,2,2),TAMDR(9,4,3,2),MYGTAM(4),IGT5,F50K
106043      C
106044      C Decide whether non-1/M or non-1/M & 1/M rates are to be entered.
106045      C
106046      C      IF (IMFLAG.EQ.2) GOTO 10
106047      C
106048      C      IF (PROMPT.EQ.2) WRITE (IOUASK,200)
106049      200 FORMAT(' ','Enter tampering intercepts (zero mile levels)')
106050      C      IF (PROMPT.EQ.2) WRITE (IOUASK,210)
106051      210 FORMAT(' ','for non-1/M case only:')
106052      C      READ (IOUGEN,100,END=99)
106053      C      *      (((TAMZML(ID,1VTAM,IGD,1),ID=1,8),1VTAM=1,4),IGD=1,2)
106054      100 FORMAT(8F8.4)
106055      C      IF (PROMPT.EQ.2) WRITE (IOUASK,220)
106056      220 FORMAT(' ','Enter tampering slopes (deterioration rates)')
106057      C      IF (PROMPT.EQ.2) WRITE (IOUASK,210)

```

Appendix C: MOBILE4 Subroutine GETTAM

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```

106058      READ (IOUGEN,120,END=99)
106059      *      (((TAMDR(ID,IVTAM,IGD,1),ID=1,8),IVTAM=1,4),IGD=1,3)
106060      120 FORMAT (8F9.5)
106061      GOTO 20
106062      C
106063      C Read in all but cell 9 of TAMZML & TAMDR (if picked up cell 9 too, could
106064      C just put in READ(---) TAMZML / TAMDR, since user inputs in FTN array order.
106065      C
106066      10 IF (PROMPT.EQ.2) WRITE (IOUASK,200)
106067      IF (PROMPT.EQ.2) WRITE (IOUASK,230)
106068      230 FORMAT (' ','for non-1/M and 1/M cases:')
106069      READ (IOUGEN,100,END=99)
106070      *      (((TAMZML(ID,IVTAM,IGD,IM),ID=1,8),IVTAM=1,4),IGD=1,2),IM=1,2)
106071      IF (PROMPT.EQ.2) WRITE (IOUASK,220)
106072      IF (PROMPT.EQ.2) WRITE (IOUASK,230)
106073      READ (IOUGEN,120,END=99)
106074      *      (((TAMDR(ID,IVTAM,IGD,IM),ID=1,8),IVTAM=1,4),IGD=1,3),IM=1,2)
106075      C
106076      C Move overall misfueling ZML/DR to ID=9. Compute other misfueling ZML/DR
106077      C for ID=4 as (overall - filler neck). For every disablement case,
106078      C insure tampering zero mile levels (intercepts) do not exceed unity.
106079      C There is no range check for deterioration rates.
106080      C
106081      20 DO 30 IM=1,IMFLAG
106082      DO 30 IGD=1,2
106083      DO 30 IVTAM=1,4
106084      TAMZML (9,IVTAM,IGD,IM)=TAMZML (4,IVTAM,IGD,IM)
106085      TAMDR (9,IVTAM,IGD,IM)=TAMDR (4,IVTAM,IGD,IM)
106086      TAMZML (4,IVTAM,IGD,IM)=
106087      *      TAMZML (9,IVTAM,IGD,IM)-TAMZML (3,IVTAM,IGD,IM)
106088      TAMDR (4,IVTAM,IGD,IM)=TAMDR (9,IVTAM,IGD,IM)-TAMDR (3,IVTAM,IGD,IM)
106089      DO 30 ID=1,9
106090      ZEROML=TAMZML (ID,IVTAM,IGD,IM)
106091      IF (ZEROML.GT.1.0) CALL QUITER (ZEROML,0,50,INERR)
106092      30 CONTINUE
106093      C
106094      DO 40 IM=1,IMFLAG
106095      DO 40 IVTAM=1,4
106096      TAMDR (9,IVTAM,3,IM)=TAMDR (4,IVTAM,3,IM)
106097      TAMDR (4,IVTAM,3,IM)=TAMDR (9,IVTAM,3,IM)-TAMDR (3,IVTAM,3,IM)
106098      40 CONTINUE
106099      C
106100      RETURN
106101      C
106102      C EOF on any attempted read => take alternate return 1 => run aborts.
106103      C
106104      99 RETURN1
106105      END

```

Appendix C: MOBILE4 Subroutine GETVMT

May 5, 1989

```

107000      SUBROUTINE GETVMT(INERR,*)
107001      C
107002      C GETVMT gets the fleet vehicle miles travelled (vmt) mix by vehicle type.
107003      C
107004      C Called by ONESEC and PARSEC.
107005      C
107006      C Calls QUITER.
107007      C
107008      C Input on call:
107009      C
107010      C   common blocks:
107011      C   /FLAGS1/ PROMPT
107012      C   /IOUCOM/ IOUGEN, IOUASK
107013      C   /MAXIMA/ MAXVEH
107014      C
107015      C Output on return:
107016      C
107017      C   parameter list: INERR
107018      C   common block: /VMXCOM/ VMTMIX
107019      C
107020      C Local variable / array dictionary:
107021      C
107022      C   Name      Type      Description
107023      C   -----
107024      C   VMTCHK    R        vmt mix check: sum of the vmt fractions = 1.0 +/- 1.E-6
107025      C                      (i.e., a normalized vmt distribution has been entered)
107026      C
107027      C Notes:
107028      C
107029      C none
107030      C
107031      C
107032      C   INTEGER PROMPT, TAMFLG, SPDFLG, VMFLAG
107033      C
107034      C   COMMON /FLAGS1/ PROMPT, TAMFLG, SPDFLG, VMFLAG
107035      C   COMMON /IOUCOM/ IOUIMD, IOUGEN, IOUREP, IOUERR, IOUASK
107036      C   COMMON /MAXIMA/ MAXVEH, MAXLTW, MAXPOL, MAXREG, MAXYRS
107037      C   COMMON /VMXCOM/ REGMIX(8), TFNORM(8), VMTMIX(8)
107038      C
107039      C   IF (PROMPT.EQ.2) WRITE (IOUASK,200)
107040      200 FORMAT('O', 'Enter VMT split:')
107041      READ (IOUGEN,100,END=99) VMTMIX
107042      100 FORMAT(8F4.3)
107043      C
107044      C   VMTCHK=0.0
107045      C   DO 10 IV=1, MAXVEH
107046      C   VMTCHK=VMTMIX (IV)+VMTCHK
107047      C   IF (VMTMIX (IV) .LT.0.0.OR.VMTMIX (IV) .GT.1.)
107048      *   CALL QUITER (VMTMIX (IV), 0, 17, INERR)
107049      10 CONTINUE
107050      C   IF (VMTCHK+1.E-6.LT.1..OR.VMTCHK-1.E-6.GT.1.)
107051      *   CALL QUITER (VMTCHK, 0, 18, INERR)
107052      C
107053      C   RETURN
107054      C
107055      C EOF on any attempted read => take alternate return 1 => run aborts.
107056      C
107057      99 RETURN

```

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107058

END

Appendix C: MOBILE4 Subroutine GETMRN

May 5, 1989

```

108000      SUBROUTINE GETMRN(INERR,*)
108001      C
108002      C GETMRN checks for and reads in and screens user supplied mileage accrual
108003      C rates and registration distributions. Whether or not the distributions are
108004      C replaced, they are normalized.
108005      C
108006      C Called by ONESEC.
108007      C
108008      C Calls QUITER.
108009      C
108010      C Input on call:
108011      C
108012      C     parameter list: INERR
108013      C     common blocks:
108014      C     /FLAGS1/ PROMPT
108015      C     /FLAGS2/ MYMRFG
108016      C     /IOUCOM/ IOUGEN,IOUASK
108017      C     /MAXIMA/ MAXVEH,MAXYRS
108018      C     /NAMES1/ NAMMMR
108019      C
108020      C Output on return:
108021      C
108022      C     parameter list: INERR
108023      C     common blocks:
108024      C     /MYRSAB/ AMAR,JULMYR
108025      C
108026      C Local variable / array dictionary:
108027      C
108028      C      Name      Type      Description
108029      C      -----
108030      C      CHKMYR    R      myr mix check: sum of the myr fractions = 1.0 +/- 1.E-6
108031      C                      (a normalized myr distribution has been entered for each IV)
108032      C      MYF      I      my of first (JDX order) AMAR / JULMYR to be entered on READ
108033      C      MYL      I      my of last (JDX order) AMAR / JULMYR to be entered on READ
108034      C      SUMMYR    R      sum of myr for IV; used to normalize user entered JULMYR
108035      C      ZEROML    R      user entered tampering zml to be checked: ZEROML <= 1.0
108036      C
108037      C Notes:
108038      C
108039      C GETMRN was added for MOBILE4.
108040      C
108041      C
108042      C      CHARACTER*8 NAMFLG,NAMMMR
108043      C      CHARACTER*4 NAMRVP
108044      C      INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
108045      C      INTEGER ALHFLG
108046      C      REAL JULMYR
108047      C
108048      C      COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
108049      C      COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
108050      C      COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
108051      C      COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
108052      C      COMMON /MYRSAB/ AMAR(20,8),JULMYR(20,8),NEWCUM
108053      C      COMMON /NAMES1/ NAMFLG(16),NAMMMR(2,2,8),NAMRVP(4)
108054      C
108055      C Check for user supplied my mileage accrual rates and / or registration
108056      C distributions.
108057      C

```

Appendix C: MOBILE4 Subroutine GETMRN

May 5, 1989

```

108058      IF (MYMRFG.EQ.1) GOTO 65
108059      IF (MYMRFG.EQ.3) GOTO 20
108060      C
108061      C Get mileage accrual rates.
108062      C
108063      IF (PROMPT.EQ.2) WRITE (IOUASK,200)
108064      200 FORMAT (/)
108065      C
108066      DO 10 IV=1,MAXVEH
108067      DO 10 IG=1,2
108068      IF (PROMPT.EQ.2) WRITE (IOUASK,210) (NAMMMR (ICH,IG,IV),ICH=1,2)
108069      210 FORMAT (' ', 'Enter MYM ages ',2A8)
108070      MYF=1
108071      IF (IG.EQ.2) MYF=11
108072      MYL=10
108073      IF (IG.EQ.2) MYL=20
108074      READ (IOUGEN,110,END=99) (AMAR (JDX,IV),JDX=MYF,MYL)
108075      110 FORMAT (10F7.5)
108076      10 CONTINUE
108077      C
108078      DO 15 IV=1,MAXVEH
108079      DO 15 JDX=1,MAXYRS
108080      IF (AMAR (JDX,IV).LT.0.0) CALL QUITER (AMAR (JDX,IV),0,19,INERR)
108081      15 CONTINUE
108082      C
108083      IF (MYMRFG.EQ.2) GOTO 45
108084      C
108085      C Get vehicle registration distributions.
108086      C
108087      20 IF (PROMPT.EQ.2) WRITE (IOUASK,200)
108088      DO 35 IV=1,MAXVEH
108089      C
108090      DO 25 IG=1,2
108091      IF (PROMPT.EQ.2) WRITE (IOUASK,220) (NAMMMR (ICH,IG,IV),ICH=1,2)
108092      220 FORMAT (' ', 'Enter MYR ages ',2A8)
108093      MYF=1
108094      IF (IG.EQ.2) MYF=11
108095      MYL=10
108096      IF (IG.EQ.2) MYL=20
108097      READ (IOUGEN,120,END=99) (JULMYR (JDX,IV),JDX=MYF,MYL)
108098      120 FORMAT (10F5.3)
108099      25 CONTINUE
108100      C
108101      CHKMYR=0.0
108102      DO 30 JDX=1,MAXYRS
108103      CHKMYR=JULMYR (JDX,IV)+CHKMYR
108104      30 CONTINUE
108105      C
108106      IF (CHKMYR-.00001.GT.1..OR.CHKMYR+.00001.LT.1.)
108107      * CALL QUITER (CHKMYR,0,49,INERR)
108108      35 CONTINUE
108109      C
108110      DO 40 IV=1,MAXVEH
108111      DO 40 JDX=1,MAXYRS
108112      IF (JULMYR (JDX,IV).LT.0.0) CALL QUITER (JULMYR (JDX,IV),0,20,INERR)
108113      40 CONTINUE
108114      C
108115      45 DO 55 IV=1,MAXVEH

```

```

108116 C
108117 C Skip 0 with non-0 checks if user supplies MYR only and on HDDV pass:
108118 C the BD values are 0.0's for all 20 my's (HDDMYM has not yet been called).
108119 C
108120 IF (MYMRFG.EQ.3.AND.IV.EQ.7) GOTO 55
108121 DO 50 JDX=1,MAXYRS
108122 IF (AMAR(JDX,IV).LE.0.0.AND.JULMYR(JDX,IV).GT.0.0)
108123 * CALL QUITER(JULMYR(JDX,IV),0,21,INERR)
108124 IF (AMAR(JDX,IV).GT.0.0.AND.JULMYR(JDX,IV).EQ.0.0)
108125 * CALL QUITER(AMAR(JDX,IV),0,22,INERR)
108126 50 CONTINUE
108127 55 CONTINUE
108128 C
108129 C Check vehicle equalities (LDGV,LDDV), (LDGT1,LDDT) mod yr regs.
108130 C
108131 DO 60 JDX=1,MAXYRS
108132 IF (JULMYR(JDX,1).NE.JULMYR(JDX,5)) CALL QUITER(0.,JDX,65,INERR)
108133 IF (JULMYR(JDX,2).NE.JULMYR(JDX,6)) CALL QUITER(0.,JDX,66,INERR)
108134 60 CONTINUE
108135 C
108136 C Normalize JULMYR.
108137 C
108138 65 DO 75 IV=1,MAXVEH
108139 C
108140 SUMMYR=0.0
108141 DO 70 JDX=1,MAXYRS
108142 SUMMYR=JULMYR(JDX,IV)+SUMMYR
108143 70 CONTINUE
108144 IF (SUMMYR.EQ.0.0) SUMMYR=1.
108145 C
108146 DO 75 JDX=1,MAXYRS
108147 JULMYR(JDX,IV)=JULMYR(JDX,IV)/SUMMYR
108148 75 CONTINUE
108149 C
108150 RETURN
108151 C
108152 C EOF on any attempted read => take alternate return 1 => run aborts.
108153 C
108154 99 RETURN1
108155 END

```

Appendix C: MOBILE4 Subroutine GETERQ

May 5, 1989

```

109000      SUBROUTINE GETERQ(INERR,*)
109001      C
109002      C   GETERQ reads in, performs range checks on, converts to gpm if IV = HDV,
109003      C   and stores replacement emission factor rates & their associated parameters.
109004      C
109005      C   Called by ONESEC.
109006      C
109007      C   Calls HDCGPM, QUITER, STOERQ and YRTEST.
109008      C
109009      C   Input on call:
109010      C
109011      C       parameter list: INERR
109012      C       common blocks:
109013      C       /BASEQ4/ MAXCT
109014      C       /FLAGS1/ PROMPT
109015      C       /IOUCOM/ IOUGEN,IOUASK
109016      C       /YEARS4/ IY1941,IY2020
109017      C
109018      C   Output on return:
109019      C
109020      C       parameter list: INERR
109021      C       common blocks:
109022      C       /BASEQ4/ NEWPAR,BERNEW,NEWFIT,NEWCT
109023      C
109024      C   Local variable / array dictionary:
109025      C
109026      C       Name      Type      Description
109027      C       -----
109028      C   A5ONNEW      R          above 50K miles deterioration rate, nonzero for 1981+ LDGV
109029      C                                     HC/CO cases only (local variable: not used in HDCGPM)
109030      C   KINK50      I          kinked at 50K miles ef curve flag: 1 = no, 2 = yes
109031      C   NEWPOL      I          new emission rate's pollutant code
109032      C   NEWREG      I          new emission rate's region code
109033      C
109034      C   Notes:
109035      C
109036      C   GETERQ was added for MOBILE4.
109037      C   GETERQ was modified in MOBILE4 to add above 50K miles slope field.
109038      C
109039      C
109040      C       INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
109041      C
109042      C       COMMON /BASEQ3/ NEWVEH,NEWMYF,NEWMYL,ZMLNEW,DRNEW,KINKS
109043      C       COMMON /BASEQ4/NEWPAR(5,100),BERNEW(3,100),NEWFIT(100),NEWCT,MAXCT
109044      C       COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
109045      C       COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
109046      C       COMMON /YEARS4/ IY1941,IY1960,IY2020
109047      C
109048      C   Read in number of new ef rate records to be processed.
109049      C
109050      C       IF (PROMPT.EQ.2) WRITE (IOUASK,200)
109051      C   200 FORMAT('O','Enter no. of new e.f. intercept/slope pairs (13):')
109052      C       READ (IOUGEN,100,END=99) NEWCT
109053      C   100 FORMAT(13)
109054      C       IF (NEWCT.LT.1.OR.NEWCT.GT.MAXCT) CALL QUITER(0.,NEWCT,23,INERR)
109055      C
109056      C   Read in and process one record at a time.
109057      C

```

Appendix C: MOBILE4 Subroutine GETERQ

May 5, 1989

```

109058      KINKS=1
109059      DO 10 IFAC=1,NEWCT
109060      IF (PROMPT.EQ.2) WRITE(10UASK,210)
109061      210 FORMAT(' ','Enter region,veh. type,pollutant,first my, '/
109062      * ' ','last my,intercept,slope & above 50K miles slope:')
109063      READ(10UGEN,110,END=99) NEWREG,NEWVEH,NEWPOL,NEWMYF,NEWMYL,
109064      * ZMLNEW,DRNEW,A5ONNEW
109065      110 FORMAT(11,2(1X,11),2(1X,12),3(1X,F6.2))
109066      IF (NEWREG.LT.1.OR.NEWREG.GT.2) CALL QUITER(0.,NEWREG,62,INERR)
109067      IF (NEWVEH.LT.1.OR.NEWVEH.GT.8) CALL QUITER(0.,NEWVEH,25,INERR)
109068      IF (NEWPOL.LT.1.OR.NEWPOL.GT.3) CALL QUITER(0.,NEWPOL,26,INERR)
109069      CALL YRTEST(NEWMYF,27,1Y1941,1Y2020,INERR)
109070      CALL YRTEST(NEWMYL,27,1Y1941,1Y2020,INERR)
109071      IF (NEWMYL.LT.NEWMYF) CALL QUITER(0.,0,29,INERR)
109072      KINK50=1
109073      IF (NEWVEH.EQ.1.AND.NEWPOL.LE.2.AND.NEWMYF.GE.1981) KINK50=2
109074      IF (KINK50.EQ.2) KINKS=2
109075      IF (ZMLNEW.LE.0.0) CALL QUITER(ZMLNEW,0,30,INERR)
109076      IF (DRNEW.LT.0.0) CALL QUITER(DRNEW,0,31,INERR)
109077      IF (KINK50.EQ.2.AND.A5ONNEW.LT.0.0) CALL QUITER(A5ONNEW,0,31,INERR)
109078      C
109079      C If the emission rate is for a heavy duty vehicle class, convert the rate's
109080      C units from grams per brakehorsepower to grams per mile.
109081      C
109082      IF (NEWVEH.EQ.4.OR.NEWVEH.EQ.7) CALL HDCGPM
109083      C
109084      C Save screened data in temporary storage areas.
109085      C
109086      NEWPAR(1,IFAC)=NEWREG
109087      NEWPAR(2,IFAC)=NEWVEH
109088      NEWPAR(3,IFAC)=NEWPOL
109089      NEWPAR(4,IFAC)=NEWMYF
109090      NEWPAR(5,IFAC)=NEWMYL
109091      BERNEW(1,IFAC)=ZMLNEW
109092      BERNEW(2,IFAC)=DRNEW
109093      IF (KINK50.EQ.1) BERNEW(3,IFAC)=-1.0
109094      IF (KINK50.EQ.2) BERNEW(3,IFAC)=A5ONNEW
109095      10 CONTINUE
109096      C
109097      C Store new ef equations for later access by BEF.
109098      C
109099      CALL STOERQ(INERR)
109100      C
109101      RETURN
109102      C
109103      C EOF on any attempted read => take alternate return 1 => run aborts.
109104      C
109105      99 RETURN1
109106      END

```


Appendix C: MOBILE4 Subroutine YRTEST

May 5, 1989

```

110000      SUBROUTINE YRTEST(IY,NERR,IY1,IY2,INERR)
110001      C
110002      C YRTEST converts 2-digit input year to 4-digit year.
110003      C
110004      C Called by GETATP, GETERQ, GETIMP, GETNAT, PARSEC and RDCITY.
110005      C
110006      C Calls QUITER.
110007      C
110008      C Input on call:
110009      C
110010      C   parameter list: IY,NERR,IY1,IY2,INERR
110011      C   common blocks:
110012      C   /YEARS4/ IY1941
110013      C
110014      C Output on return:
110015      C
110016      C   parameter list: IY,INERR
110017      C
110018      C Local variable dictionary:
110019      C
110020      C   Name   Type           Description
110021      C   ----   ---   -----
110022      C   II      I      IY converted to 4 digit year
110023      C
110024      C Notes:
110025      C
110026      C none
110027      C
110028      C
110029      C   COMMON /YEARS4/ IY1941,IY1960,IY2020
110030      C
110031      C   II=IY+1900
110032      C   IF (II.LT.IY1941) II=II+100
110033      C   IF (IY.LT.0.OR.II.LT.IY1.OR.II.GT.IY2)
110034      C   * CALL QUITER(0.,IY,NERR,INERR)
110035      C   IY=II
110036      C   RETURN
110037      C   END

```

```

111000      SUBROUTINE HDCGPM
111001      C
111002      C  HDCGPM converts user entered new emission rates from grams per brake-
111003      C  horsepower units to grams per mile units.
111004      C
111005      C  Called by GETERQ.
111006      C
111007      C  Calls HDCPIC.
111008      C
111009      C  Input on call:
111010      C
111011      C      common block: /BASEQ3/ NEWVEH,NEWMYF,NEWMYL,ZMLNEW,DRNEW
111012      C
111013      C  Output on return:
111014      C
111015      C      common block: /BASEQ3/ ZMLNEW,DRNEW
111016      C
111017      C  Local variable dictionary:
111018      C
111019      C      Name      Type      Description
111020      C      -----
111021      C  CONV        R      conversion factor to be used for a given MY and IV
111022      C  DRSUM        R      sum of the converted deterioration rates for the model years
111023      C                      in the range specified by the user
111024      C  RANGE        R      number of model years in the my range specified by the user
111025      C                      for which the new emission rate is to be used.
111026      C  ZMLSUM        R      sum of the converted zero mile levels for the model years
111027      C                      in the range specified by the user
111028      C
111029      C  Notes:
111030      C
111031      C  HDCGPM was added for MOBILE4.
111032      C
111033      C
111034      C      COMMON /BASEQ3/ NEWVEH,NEWMYF,NEWMYL,ZMLNEW,DRNEW,KINKS
111035      C
111036      C  Apply each model year's conversion factor to the user's emission rate
111037      C  and add the result to the running sums.
111038      C
111039      C      ZMLSUM=0.0
111040      C      DRSUM=0.0
111041      C      DO 10 MY=NEWMYF,NEWMYL
111042      C      CONV=HDCPIC (MY,NEWVEH)
111043      C      ZMLSUM=ZMLSUM+(CONV*ZMLNEW)
111044      C      DRSUM=DRSUM+(CONV*DRNEW)
111045      C  10  CONTINUE
111046      C
111047      C  Divide the sums by the number of my's in the range to get the average
111048      C  emission rate.
111049      C
111050      C      RANGE=NEWMYL-NEWMYF+1
111051      C      ZMLNEW=ZMLSUM/RANGE
111052      C      DRNEW=DRSUM/RANGE
111053      C
111054      C  Alternative, less "user friendly", but more efficient method:
111055      C  Compute the average conversion rate for the interval and multiply
111056      C  times the entered rates.
111057      C

```

111058
111059

RETURN
END

Appendix C: MOBILE4 Function HDCPIC

May 5, 1989

```

112000      FUNCTION HDCPIC(MY,IV)
112001      C
112002      C   HDCPIC picks the HDV gpbhp to gpm units conversion factor.
112003      C
112004      C   Called by HDCGPM.
112005      C
112006      C   Input on call:
112007      C
112008      C       parameter list: MY,IV
112009      C       common blocks:
112010      C       /HDCCOM/ HDCFAC,LOWYR,MAXCIG
112011      C
112012      C   Output on return:
112013      C
112014      C       function: HDCPIC
112015      C
112016      C   Notes:
112017      C
112018      C   HDCPIC was added for MOBILE4.
112019      C
112020      C
112021      COMMON /HDCCOM/ HDCFAC(37,2),LOWYR,MAXCIG
112022      C
112023      C   There is a different conversion factor for each model year from
112024      C   LOWYR up through MAXCIG's year. Below LOWYR, use LOWYR's.
112025      C   Above MAXCIG's year, use MAXCIG's year's.
112026      C
112027      IG=MY-LOWYR+1
112028      IF(IG.LT.1) IG=1
112029      IF(IG.GT.MAXCIG) IG=MAXCIG
112030      C
112031      C   IV must be a HDV code (4 or 7).
112032      C
112033      IF(IV.EQ.4) IVHD=1
112034      IF(IV.EQ.7) IVHD=2
112035      C
112036      HDCPIC=HDCFAC(IG,IVHD)
112037      C
112038      RETURN
112039      END

```

Appendix C: MOBILE4 Subroutine STOERQ

May 5, 1989

```

113000      SUBROUTINE STOERQ(INERR)
113001      C
113002      C  STOERQ attempts to store the user-supplied specifications for new FTP basic
113003      C  emission rate equations and when successful (i.e., when room found in the
113004      C  user supplied rate arrays), zeroes out all idle coefficients for the
113005      C  specified pollutant, vehicle and region combination.
113006      C
113007      C  Called by GETERQ.
113008      C
113009      C  Calls QUITER.
113010      C
113011      C  Input on call:
113012      C
113013      C      parameter list: INERR
113014      C      common blocks:
113015      C      /BASEQ4/ NEWPAR,BERNEW,NEWCT
113016      C      /BASEQ6/ MAXERU
113017      C      /FLAGS4/ IDLFLG
113018      C      /IDLEQ2/ MAXIDL
113019      C
113020      C  Output on return:
113021      C
113022      C      parameter list: INERR
113023      C      common blocks:
113024      C      /BASEQ4/ NEWFIT
113025      C      /BASEQ5/ ERUZML,ERUDR,ERU50K
113026      C      /BASEQ6/ MYGERU,NUMERU
113027      C      /BASEQ7/ IPMOD
113028      C      /IDLEQ1/ ZMLIDL,DRIDL
113029      C
113030      C  Notes:
113031      C
113032      C  STOERQ was updated for MOBILE4.
113033      C  STOERQ was modified in MOBILE4 to add the above 50K miles slope field.
113034      C
113035      C
113036      C      INTEGER PRTFLG,HCFLAG
113037      C
113038      C      COMMON /BASEQ4/NEWPAR(5,100),BERNEW(3,100),NEWFIT(100),NEWCT,MAXCT
113039      C      COMMON /BASEQ5/ ERUZML(12,3,8,2),ERUDR(12,3,8,2),ERU50K(12,2,2)
113040      C      COMMON /BASEQ6/ MYGERU(12,2,3,8,2),MAXERU,NUMERU(3,8,2),KEYER,IGER
113041      C      COMMON /BASEQ7/ IPMOD(3)
113042      C      COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
113043      C      COMMON /IDLEQ1/ ZMLIDL(15,3,8,2),DRIDL(15,3,8,2)
113044      C      COMMON /IDLEQ2/ MYGIDL(15,3,8,2),MAXIDL
113045      C
113046      C      DO 20 IFAC=1,NEWCT
113047      C      NEWFIT(IFAC)=0
113048      C      IR=NEWPAR(1,IFAC)
113049      C      IV=NEWPAR(2,IFAC)
113050      C      IP=NEWPAR(3,IFAC)
113051      C
113052      C  Check if there's room to store equation IFAC's parameters.
113053      C
113054      C      IERNEW=NUMERU(IP,IV,IR)+1
113055      C      IF (IERNEW.GT.MAXERU) CALL QUITER(0.,IFAC,51,INERR)
113056      C      IF (IERNEW.GT.MAXERU) GOTO 20
113057      C

```



```
113058 C There is room.
113059 C
113060     NUMERU(IP,IV,IR)=IERNEW
113061     MYGERU(IERNEW,1,IP,IV,IR)=NEWPAR(4,IFAC)
113062     MYGERU(IERNEW,2,IP,IV,IR)=NEWPAR(5,IFAC)
113063     ERUZML(IERNEW,IP,IV,IR)=BERNEW(1,IFAC)
113064     ERUDR(IERNEW,IP,IV,IR)=BERNEW(2,IFAC)
113065     IF (BERNEW(3,IFAC).GE.0.0) ERU5OK(IERNEW,IP,IR)=BERNEW(3,IFAC)
113066     NEWFIT(IFAC)=1
113067 C
113068 C Set flag to skip VIDLE calculation for IP affected by accepted new equation.
113069 C Warn user and then zero out all idle coefficients for the accepted new
113070 C (IP,IV,IR) equation case. Skip if idle ef not requested or already zeroed
113071 C out this case.
113072 C
113073     IF (IDLFLG.EQ.1.OR.NUMERU(IP,IV,IR).GT.1) GOTO 20
113074     IF (IPMOD(IP).EQ.0) IPMOD(IP)=1
113075     CALL QUITER(0.,IFAC,59,INERR)
113076     DO 10 IEQU=1,MAXIDL
113077         ZMLIDL(IEQU,IP,IV,IR)=0.0
113078         DRIDL(IEQU,IP,IV,IR)=0.0
113079 10 CONTINUE
113080 C
113081 20 CONTINUE
113082 C
113083     RETURN
113084     END
```

Appendix C: MOBILE4 Subroutine GETIMP

May 5, 1989

```

114000      SUBROUTINE GETIMP(INERR,*)
114001      C
114002      C GETIMP reads in and processes the I/M Program parameter record and, if
114003      C requested, calls GETIMC to get alternate I/M Credits.
114004      C
114005      C Called by ONESEC.
114006      C
114007      C Calls GETIMC, QUITER and YRTEST.
114008      C
114009      C Input on call:
114010      C
114011      C   common blocks:
114012      C   /FLAGS1/ PROMPT
114013      C   /IOUCOM/ IOUGEN,IOUASK
114014      C   /YEARS4/ IY1941,IY1960,IY2020
114015      C
114016      C Output on return:
114017      C
114018      C   parameter list: INERR
114019      C   common blocks:
114020      C   /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER,CRIM
114021      C   /IMPAR2/ ILDT,ITEST,NUDATA,NONUDA,NLIM,IMNAME
114022      C   /IMPAR6/ IFREQ,INTYP
114023      C
114024      C Local variable / array dictionary:
114025      C
114026      C   Name      Type      Description
114027      C   -----
114028      C   ICHGBD    I         replace credits selection summary answering "change BD values?"
114029      C                       1 = all FTP and idle credits arrays are using BD values.
114030      C                       2 = at least 1 credits array will be changed by the user.
114031      C   IUSEBD    I         replace credits selection summary answering "use BD values?"
114032      C                       1 = at least 1 FTP and 1 idle array contents are replaced.
114033      C                       2 = either all FTP arrays or all idle arrays or both are
114034      C                       using the BLOCK DATA values.
114035      C
114036      C Notes:
114037      C
114038      C GETIMP was added for MOBILE4.
114039      C GETIMP was modified in MOBILE4 to handle the I/M Program input changes.
114040      C
114041      C
114042      C   CHARACTER*4 IMNAME
114043      C   INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
114044      C
114045      C   COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
114046      C   COMMON /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER(2),CRIM
114047      C   COMMON /IMPAR2/ ILDT(4),ITEST,NUDATA(2),NONUDA,NLIM,IMNAME(20,9)
114048      C   COMMON /IMPAR6/ IFREQ,INTYP
114049      C   COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
114050      C   COMMON /YEARS4/ IY1941,IY1960,IY2020
114051      C
114052      C   NLIM=0
114053      C   IF (PROMPT.EQ.2) WRITE (IOUASK,200)
114054      200 FORMAT('0','Enter the I/M Program parameters record:/'
114055      *          '0','Program start year, stringency,/'
114056      *          ' ','first and last model year getting benefits,/'
114057      *          ' ','old tech waiver rate, new tech waiver rate,/'

```

Appendix C: MOBILE4 Subroutine GETIMP

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```

114058      *      ' ','compliance rate,'/
114059      *      ' ','inspection type,'/
114060      *      ' ','frequency of I/M inspection,'/
114061      *      ' ','vehicle classes covered, test type,'/
114062      *      ' ','flag for alternate I/M credits,Tech I&I & Tech IV+,'/
114063      *      ' ','the format is :'/
114064      *      ' ','(4(12,1X),2(F2.0,1X),F3.0,1X,11,
114065      *      ' ','1X,11,1X,411,1X,11,1X,211)')
114066      READ(10UGEN,100,END=99)
114067      *      ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER(1),WAIVER(2),CRIM,INTYP,
114068      *      IFREQ,ILDT,ITEST,NUDATA
114069      100 FORMAT(4(12,1X),2(F2.0,1X),F3.0,1X,11,
114070      *      1X,11,1X,411,1X,11,1X,211)
114071
114072      C      Check I/M inputs.
114073      C
114074      CALL YRTEST(ICYIM,32,IY1960,IY2020,INERR)
114075      IF(ISTRIN.LT.10.OR.ISTRIN.GT.50) CALL QUITER(0.,ISTRIN,33,INERR)
114076      CALL YRTEST(MODYR1,35,IY1941,IY2020,INERR)
114077      CALL YRTEST(MODYR2,36,IY1941,IY2020,INERR)
114078      IF(MODYR1.GT.MODYR2) CALL QUITER(0.,0,37,INERR)
114079      IF(WAIVER(1).LT.0.0.OR.WAIVER(1).GT.50.)
114080      *      CALL QUITER(WAIVER(1),0,100,INERR)
114081      IF(WAIVER(2).LT.0.0.OR.WAIVER(2).GT.50.)
114082      *      CALL QUITER(WAIVER(2),0,100,INERR)
114083      IF(CRIM.LT.0.0.OR.CRIM.GT.100.) CALL QUITER(CRIM,0,34,INERR)
114084      IF(INTYP.LT.1.OR.INTYP.GT.3) CALL QUITER(0.,INTYP,82,INERR)
114085      IF(IFREQ.LT.1.OR(IFREQ.GT.2) CALL QUITER(0.,IFREQ,101,INERR)
114086
114087      C      Convert the 2 waiver rates from percents to percentages for PCLEFT.
114088      C
114089      WAIVER(1)=WAIVER(1)/100.
114090      WAIVER(2)=WAIVER(2)/100.
114091
114092      C
114093      DO 10 IVIM=1,4
114094      *      IF(ILDT(IVIM).LT.1.OR.ILDT(IVIM).GT.2)
114095      *      CALL QUITER(0.,ILDT(IVIM),72,INERR)
114096      10 CONTINUE
114097
114098      C      IF(ITEST.LT.1.OR.ITEST.GT.3) CALL QUITER(0.,ITEST,73,INERR)
114099
114100      NONUDA=2
114101      DO 20 ICR=1,2
114102      *      IF(NUDATA(ICR).LT.1.OR.NUDATA(ICR).GT.2)
114103      *      CALL QUITER(0.,NUDATA(ICR),74,INERR)
114104      IF(NUDATA(ICR).EQ.2) NONUDA=1
114105      20 CONTINUE
114106
114107      C      Set use Block Data and change Block Data switches. If user is requesting
114108      C      biennial inspection, check that all Block Data credits are being replaced.
114109      C
114110      IUSEBD=1
114111      ICHGBD=1
114112      IF(NONUDA.EQ.2) IUSEBD=2
114113      IF(NONUDA.EQ.1) ICHGBD=2
114114
114115      C      If at least 1 array is to have its values replaced, do so.

```

Appendix C: MOBILE4 Subroutine GETIMP

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```
114116 C
114117 IF (ICHGBD.EQ.2) CALL GETIMC(*99)
114118 C
114119 RETURN
114120 C
114121 C EOF on any attempted read => take alternate return 1 => run aborts.
114122 C
114123 99 RETURN
114124 END
```

Appendix C: MOBILE4 Subroutine GETIMC

May 5, 1989

```

115000      SUBROUTINE GETIMC(*)
115001      C
115002      C GETIMC reads in user supplied alternative I/M credits. GETIMC is called
115003      C only when IMFLAG = 2 and NUDATA(i) > 1 .
115004      C
115005      C Called by ONESEC.
115006      C
115007      C Input on call:
115008      C
115009      C common blocks:
115010      C /IMPAR2/ NUDATA,NONUDA
115011      C /IOUCOM/ IOUIMD,IOUERR
115012      C
115013      C Output on return:
115014      C
115015      C common blocks:
115016      C /ICR4VA/ CRD4VA
115017      C /ICR4VB/ CRD4VB
115018      C /IMPAR2/ NLIM,IMNAME
115019      C /IM12HC/ CR12HC
115020      C /IM12CO/ CR12CO
115021      C
115022      C Notes:
115023      C
115024      C GETIMC was modified in MOBILE4 to handle the I/M Program input changes.
115025      C
115026      C
115027      C CHARACTER*4 IMNAME
115028      C
115029      C COMMON /ICR4VA/ CRD4VA(19,2,12,3)
115030      C COMMON /ICR4VB/ CRD4VB(19,2,12,3)
115031      C COMMON /IMPAR2/ ILDT(4),ITEST,NUDATA(2),NONUDA,NLIM,IMNAME(20,9)
115032      C COMMON /IMPAR6/ IFREQ,INTYP
115033      C COMMON /IM12HC/ CR12HC(19,20,5,2)
115034      C COMMON /IM12CO/ CR12CO(19,20,5,2)
115035      C COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
115036      C
115037      C IF(NONUDA.EQ.2) GOTO 60
115038      C
115039      C User supplies alternative FTP I/M credits.
115040      C
115041      C Read the number of lines in the I/M credits description.
115042      C
115043      C READ(IOUIMD,100,END=70,ERR=80)NLIM
115044      C 100 FORMAT(I1)
115045      C
115046      C IF(NLIM.EQ.0) GOTO 20
115047      C
115048      C Read I/M program credits file description.
115049      C
115050      C DO 10 LINES=1,NLIM
115051      C READ(IOUIMD,110,END=70,ERR=80) (IMNAME(NCH,LINES),NCH=1,20)
115052      C 110 FORMAT(20A4)
115053      C 10 CONTINUE
115054      C
115055      C Read in FTP I/M credits, for technologies 1/2 and / or 4+ annual or biennial
115056      C programs.
115057      C

```


Appendix C: MOBILE4 Subroutine GETIMC

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```
115058      20 IF (NUDATA(1).EQ.2) READ(10UIMD,120,END=70,ERR=80) CR12HC,CR12CO
115059          IF (NUDATA(2).EQ.2.AND.1FREQ.EQ.1)
115060              *      READ(10UIMD,120,END=70,ERR=80) CRD4VA
115061          IF (NUDATA(2).EQ.2.AND.1FREQ.EQ.2)
115062              *      READ(10UIMD,120,END=70,ERR=80) CRD4VB
115063      120 FORMAT(19F4.3)
115064      60 RETURN
115065      C
115066      70 CALL QUITER(0.,0,54,INERR)
115067          GOT099
115068      C
115069      80 CALL QUITER(0.,0,55,INERR)
115070      C
115071      99 RETURN1
115072          END
```

Appendix C: MOBILE4 Subroutine GETATP

May 5, 1989

```

116000      SUBROUTINE GETATP(INERR)
116001      C
116002      C  GETATP gets and verifies anti-tampering program parameters and effectiveness
116003      C  rates.  GETATP is called when ATPFLG = 2.
116004      C
116005      C  Called by ONESEC.
116006      C
116007      C  Calls ATPAER and CALAER.
116008      C
116009      C  Input on call:
116010      C
116011      C    parameter list: INERR
116012      C    common blocks:
116013      C    /FLAGS1/  PROMPT
116014      C    /FLAGS2/  IMFLAG
116015      C    /IOUCOM/  IOUASK
116016      C    /IMPAR1/  CRIM
116017      C    /IMPAR6/  IFREQ,INTYP
116018      C    /YEARS4/  IY1960,IY2020
116019      C
116020      C  Output on return:
116021      C
116022      C    parameter list: INERR
116023      C    common blocks:
116024      C    /ATPAR1/  LAPSY,LAPIST,LAPLST,LVTFLG
116025      C    /ATPAR2/  ATPPGM,ATPFQT,CRATP,DISTYP(8)
116026      C    /EGSCAL/  AER
116027      C    /EVDPAT/  EVPAER
116028      C
116029      C  Local variable dictionary:
116030      C
116031      C  Name      Type      Description
116032      C  -----
116033      C  COLSUM    R          column sum values from AER: each column's sum must be
116034      C                      within the closed interval from 0.0 to 1.0.
116035      C  EVP        R          evaporative A-T effectiveness rate: each rate must be
116036      C                      within the closed interval from 0.0 to 1.0.
116037      C  LVT        I          flag indicating whether or not a vehicle type is
116038      C                      covered by the A-T program: value must be either 1 (no)
116039      C                      or 2 (yes).
116040      C  RATE        R          A-T effectiveness rate against exhaust emissions: each
116041      C                      rate must be within the closed interval from 0.0 to 1.0
116042      C
116043      C  Notes:
116044      C
116045      C  GETATP was modified in MOBILE4 to generate AER/EVPAER internally and in
116046      C  MOBILE4 to accomodate the MOBILE4 I/M Program model.
116047      C
116048      C
116049      C    INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
116050      C    INTEGER ALHFLG
116051      C    INTEGER ATPPGM,ATPFQT,DISTYP
116052      C
116053      C    COMMON /ATPAR1/  LAPSY,LAPIST,LAPLST,LVTFLG(4)
116054      C    COMMON /ATPAR2/  ATPPGM,ATPFQT,CRATP,DISTYP(8)
116055      C    COMMON /EGSCAL/  AER(11,11,2,2),TGS(11,6,4),EGS(7,2),OPENLP(20,4)
116056      C    COMMON /EVDPAT/  EVPAER(3,2),EVPTGS(3,2,4),CCEMI(7,4)
116057      C    COMMON /FLAGS1/  PROMPT,TAMFLG,SPDFLG,VMFLAG

```

Appendix C: MOBILE4 Subroutine GETATP

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```

116058      COMMON /FLAGS2/ MYMRFQ,NEWFLG,IMFLAG,ALHFLG
116059      COMMON /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER(2),CRIM
116060      COMMON /IMPAR6/ IFREQ,INTYP
116061      COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
116062      COMMON /YEARS4/ IY1941,IY1960,IY2020
116063      C
116064      C Identify program parameters: start year, first year covered, last
116065      C year covered, vehicle types covered, inspection program type,
116066      C inspection frequency, compliance rate, and disablement inspections
116067      C conducted.
116068      C
116069      IF (PROMPT.EQ.2) WRITE(IOUASK,200)
116070      200 FORMAT ('0', 'Enter ATP start year, first & last years included, '/
116071      * ' vehicle types covered, inspection type & frequency, '/
116072      * ' compliance rate, and inspections conducted (format = '/
116073      * ' 3(12,1X),411,1X,211,1X,F4.0,1X,811):')
116074      READ(IOUGEN,100,END=90,ERR=90) LAPSY,LAPIST,LAPLST,LVTFLG,
116075      * ATPPGM,ATPFQT,CRATP,DISTYP
116076      100 FORMAT(3(12,1X),411,1X,211,1X,F4.0,1X,811)
116077      C
116078      C Verify parameters:
116079      C
116080      CALL YRTEST(LAPSY,75,IY1960,IY2020,INERR)
116081      CALL YRTEST(LAPIST,76,IY1960,IY2020,INERR)
116082      CALL YRTEST(LAPLST,77,IY1960,IY2020,INERR)
116083      C
116084      DO 10 IVTAM=1,4
116085      LVT=LVTFLG(IVTAM)
116086      IF (LVT.LT.1.OR.LVT.GT.2) CALL QUITER(0.,LVT,78,INERR)
116087      10 CONTINUE
116088      C
116089      IF (ATPPGM.LT.1.OR.ATPPGM.GT.2) CALL QUITER(0.,ATPPGM,103,INERR)
116090      IF (ATPFQT.LT.1.OR.ATPFQT.GT.2) CALL QUITER(0.,ATPFQT,104,INERR)
116091      IF (CRATP.LT.0..OR.CRATP.GT.100.) CALL QUITER(CRATP,1,105,INERR)
116092      C
116093      DO 20 I=1,8
116094      IF (DISTYP(I).LT.1.OR.DISTYP(I).GT.2)
116095      * CALL QUITER(0.,DISTYP(I),106,INERR)
116096      20 CONTINUE
116097      C
116098      C Warning is issued if I/M compliance rate is not equal to ATP
116099      C compliance rate.
116100      C
116101      IF (IMFLAG.EQ.2.AND. (CRATP.NE.CRIM))
116102      * CALL QUITER(CRIM,IMFLAG,108,INERR)
116103      C
116104      C Warning is issued if I/M inspection frequency is not equal to ATP
116105      C inspection frequency.
116106      C
116107      IF (IMFLAG.EQ.2.AND. (ATPFQT.NE.IFREQ))
116108      * CALL QUITER(0.,IFREQ,109,INERR)
116109      C
116110      C Warning is issued if I/M inspection type is not the same as the ATP
116111      C inspection type.
116112      C
116113      IF (IMFLAG.EQ.2.AND. (ATPPGM.EQ.1.AND.INTYP.NE.1))
116114      * CALL QUITER(0.,INTYP,110,INERR)
116115      IF (IMFLAG.EQ.2.AND. (ATPPGM.EQ.2.AND.INTYP.LT.2))

```

Appendix C: MOBILE4 Subroutine GETATP

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```

116116      *   CALL QUITER(0.,INTYP,110,INERR)
116117      C
116118      C   Assign base ATP effectiveness rates.
116119      C
116120      CALL ATPAER
116121      C
116122      C   Calculate ATP effectiveness rates.
116123      C
116124      CALL CALAER
116125      C
116126      C   EVPAER and AER checks.
116127      C
116128      DO 40 IAY=1,2
116129      DO 30 IHG=1,3
116130      EVP=EVPAER(IHG,IAY)
116131      IF (EVP.LT.0.0.OR.EVP.GT.1.0) CALL QUITER(EVP,0,79,INERR)
116132      30 CONTINUE
116133      40 CONTINUE
116134      C
116135      C   Note: ICOL / IROW here refers to the input file layout of the arrays.
116136      C   In subroutine ATPAER the labels are switched, to indicate the actual
116137      C   orientation of the matrices in the effectiveness computation process.
116138      C
116139      DO 80 IAY=1,2
116140      DO 70 IPG=1,2
116141      DO 60 ICOL=1,11
116142      COLSUM=0.0
116143      DO 50 IROW=1,11
116144      RATE=AER(ICOL,IROW,IPG,IAY)
116145      IF (RATE.LT.0.0.OR.RATE.GT.1.0) CALL QUITER(RATE,0,80,INERR)
116146      COLSUM=COLSUM+RATE
116147      50 CONTINUE
116148      IF (COLSUM.LT.0.0.OR.COLSUM.GT.1.0) CALL QUITER(COLSUM,0,81,INERR)
116149      60 CONTINUE
116150      70 CONTINUE
116151      80 CONTINUE
116152      C
116153      RETURN
116154      C
116155      C   "Fatal" error in trying to read ATP program description
116156      C
116157      90 CALL QUITER(0.,0,107,INERR)
116158      C
116159      RETURN
116160      END

```

```

117000      SUBROUTINE ATPAER
117001      C
117002      C  ATPAER is designed to simplify the anti-tampering effectiveness rates
117003      C  input by using a set of its parameters.
117004      C
117005      C  Called by GETATP.
117006      C
117007      C  Calls ENFORC.
117008      C
117009      C  Input on call:
117010      C
117011      C      common blocks:
117012      C      /ATPAR2/  ATPPGM,ATPFQT,CRATP,DISTYP
117013      C      /ATPAR4/  EFF
117014      C      /FLAGS2/  IMFLAG
117015      C
117016      C  Output on return:
117017      C
117018      C      common blocks:
117019      C      /ATPAR3/  AIR,CAT,ECK,TNK,EGR
117020      C      /ATPAR4/  CAN,PCV,CAP
117021      C
117022      C  Local variable dictionary:
117023      C
117024      C      Name      Type      Description
117025      C      -----
117026      C  ATPENF      R      anti-tampering enforcement rate
117027      C
117028      C  Notes:
117029      C
117030      C  ATPAER was added for MOBILE4 for AER/EVPAER internal generation.
117031      C
117032      C
117033      C      INTEGER ATPPGM,ATPFQT,DISTYP
117034      C      INTEGER MYMRFG,ALHFLG,ATPFLG
117035      C
117036      C      COMMON /ATPAR2/  ATPPGM,ATPFQT,CRATP,DISTYP(8)
117037      C      COMMON /ATPAR3/  AIR(2),CAT(2),ECK(3),TNK(2),EGR(2)
117038      C      COMMON /ATPAR4/  CAN(2),PCV(2),CAP(2),EFF(2,3,15)
117039      C      COMMON /FLAGS2/  MYMRFG,NEWFLG,IMFLAG,ALHFLG
117040      C
117041      C  Determine anti-tampering enforcement rate
117042      C
117043      C      ATPENF=ENFORC(CRATP,2)
117044      C
117045      C  Loop through for Previous/Subsequent (IAY)
117046      C
117047      C      DO 80 IAY=1,2
117048      C
117049      C      ICOL=IAY+1
117050      C
117051      C  Assign Air Pump (ID=1)
117052      C  (Annual: IROW=1, Biennial: IROW=2)
117053      C
117054      C      IF (DISTYP(1).EQ.1) GOTO 10
117055      C
117056      C      IROW=1
117057      C      IF (ATPFQT.EQ.2) IROW=2

```



```
117058 C
117059      AIR(IAY)=EFF(ATPPGM,ICOL,IROW)*ATPENF
117060 C
117061 C Assign Catalyst (ID=2)
117062 C
117063      10 IF(DISTYP(2).EQ.1) GOTO 20
117064 C
117065      IROW=3
117066 C
117067      CAT(IAY)=EFF(ATPPGM,ICOL,IROW)*ATPENF
117068 C
117069 C Assign Catalyst/Inlet (Neck) (ID=3)
117070 C (No CAT inspection: IROW=4, With I/M: IROW=5, Without I/M: IROW=6,
117071 C With Plumbtesmo Check: IROW=7; also assign NECK Previous Cat Removed)
117072 C
117073      20 IF(DISTYP(3).EQ.1) GOTO 30
117074 C
117075      IF(DISTYP(2).EQ.1) IROW=4
117076      IF(DISTYP(2).EQ.2.AND.IMFLAG.EQ.2.AND.DISTYP(4).EQ.1) IROW=5
117077      IF(DISTYP(2).EQ.2.AND.IMFLAG.EQ.1.AND.DISTYP(4).EQ.1) IROW=6
117078      IF(DISTYP(2).EQ.2.AND.DISTYP(4).EQ.2) IROW=7
117079 C
117080      NCKIAY=IAY+1
117081      ECK(NCKIAY)=EFF(ATPPGM,ICOL,IROW)*ATPENF
117082 C
117083      ECK(1)=EFF(ATPPGM,1,IROW)*ATPENF
117084 C
117085 C Assign Tailpipe Lead Deposit (Tank) (ID=4)
117086 C (With CAT inspection: IROW=8, Without CAT inspection: IROW=9)
117087 C
117088      30 IF(DISTYP(4).EQ.1) GOTO 40
117089 C
117090      IROW=8
117091      IF(DISTYP(2).EQ.2) IROW=9
117092 C
117093      TNK(IAY)=EFF(ATPPGM,ICOL,IROW)*ATPENF
117094 C
117095 C Assign EGR (ID=5)
117096 C
117097      40 IF(DISTYP(5).EQ.1) GOTO 50
117098 C
117099      IROW=10
117100 C
117101      EGR(IAY)=EFF(ATPPGM,ICOL,IROW)*ATPENF
117102 C
117103 C Assign Evap System (Canister) (ID=6)
117104 C (Annual: IROW=11, Biennial: IROW=12)
117105 C
117106      50 IF(DISTYP(6).EQ.1) GOTO 60
117107 C
117108      IROW=11
117109      IF(ATPFQT.EQ.2) IROW=12
117110 C
117111      CAN(IAY)=EFF(ATPPGM,ICOL,IROW)*ATPENF
117112 C
117113 C Assign PCV (ID=7)
117114 C (Annual: IROW=13, Biennial: IROW=14)
117115 C
```

Appendix C: MOBILE4 Subroutine ATPAER

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```
117116      60 IF (DISTYP(7).EQ.1) GOTO 70
117117      C
117118          IROW=13
117119          IF (ATPFQT.EQ.2) IROW=14
117120      C
117121          PCV(IAY)=EFF(ATPPGM,ICOL,IROW)*ATPENF
117122      C
117123      C Assign Gas Cap (ID=8)
117124      C
117125      70 IF (DISTYP(8).EQ.1) GOTO 80
117126      C
117127          IROW=15
117128      C
117129          CAP(IAY)=EFF(ATPPGM,ICOL,IROW)*ATPENF
117130      C
117131      80 CONTINUE
117132      C
117133          RETURN
117134      C
117135          END
```

```

118000      FUNCTION ENFORC(CMPLRT,IMATP)
118001      C
118002      C This REAL-VALUED function computes the enforcement rate given the
118003      C corresponding compliance rate for either I/M or ATP.
118004      C
118005      C Called by ATPAER and PCLEFT.
118006      C
118007      C Input on Call:
118008      C
118009      C parameter list: CMPLRT,IMATP
118010      C
118011      C Output on return:
118012      C
118013      C function: ENFORC
118014      C
118015      C Local array subscripts:
118016      C
118017      C A(7,2) - A ( IRNG, IMATP )
118018      C B(7,2) - B ( IRNG, IMATP )
118019      C RANGE(8,2) - RANGE ( IRNG, IMATP )
118020      C
118021      C Local variable dictionary:
118022      C
118023      C Name Type Description
118024      C -----
118025      C A R first term of the FBL linear equation: FBL=A*X+B
118026      C B R last term of the FBL linear equation: FBL=A*X+B
118027      C CMPLRT R compliance rate
118028      C FBL R fraction of benefit loss
118029      C IMATP I flag indicating whether calculating I/M or ATP rates
118030      C IRNG I index into the A, B, and RANGE arrays
118031      C NCMPT R non-compliance rate
118032      C RANGE R range limits for applying the proper A and B terms
118033      C
118034      C Notes:
118035      C
118036      C ENFORC was added for MOBILE4 for AER/EVPAER internal generation.
118037      C
118038      C
118039      REAL NCMPT
118040      REAL A(7,2),B(7,2),RANGE(8,2)
118041      C
118042      DATA A/
118043      C I/M
118044      * 2.0, 1.5, 1.4, 1.3, 1.2, 1.1, 1.0,
118045      C ATP
118046      * 2.0, 1.5, 1.4, 1.3, 1.2, 1.1, 1.0/
118047      C
118048      DATA B/
118049      C I/M
118050      * .000, .100, .175, .245, .310, .370, .425,
118051      C ATP
118052      * .000, .100, .175, .245, .310, .370, .425/
118053      C
118054      DATA RANGE/
118055      C I/M
118056      * .00, .05, .10, .15, .20, .25, .30, 999.,
118057      C ATP

```

Appendix C: MOBILE4 Function ENFORC

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```
118058      * .00, .05, .10, .15, .20, .25, .30, 999./
118059      C
118060      C
118061      NCMPT=1.-CMPLRT/100.
118062      C
118063      FBL=0.
118064      C
118065      DO 10 IRNG=1,7
118066      C
118067      IF (NCMPT.LT.RANGE (IRNG,IMATP) .OR.NCMPT.GE.RANGE (IRNG+1,
118068      *IMATP)) GO TO 10
118069      C
118070      FBL=A (IRNG,IMATP) * (NCMPT-RANGE (IRNG,IMATP)) +B (IRNG,IMATP)
118071      GO TO 20
118072      C
118073      10 CONTINUE
118074      C
118075      20 IF (FBL.GT.1.0) FBL=1.0
118076      C
118077      ENFORC=1.0-FBL
118078      C
118079      RETURN
118080      END
```

```

119000      SUBROUTINE CALAER
119001      C
119002      C CALAER calculates the effect of an anti-tampering program on
119003      C tampering rates and stores the results in the EVPAER AND AER arrays.
119004      C
119005      C Called by GETATP.
119006      C
119007      C Input on call:
119008      C
119009      C common blocks:
119010      C /ATPAR3/ AIR,CAT,ECK,TNK,EGR
119011      C /ATPAR4/ CAN,PCV,CAP
119012      C
119013      C Output on return:
119014      C
119015      C common blocks:
119016      C /EGSCAL/ AER
119017      C /EVPDAT/ EVPAER
119018      C
119019      C Local variable dictionary:
119020      C
119021      C Name      Type      Description
119022      C -----
119023      C AIREGR    R        temporary array to hold either AIR or EGR depending
119024      C                      on IPG
119025      C DIFF      R        temporary variable to hold overlap difference
119026      C DIFFA     R        temporary variable to hold another overlap difference
119027      C DIFFB     R        temporary variable to hold another overlap difference
119028      C DIFFC     R        temporary variable to hold another overlap difference
119029      C
119030      C Notes:
119031      C
119032      C CALAER was added for MOBILE4 for AER/EVPAER internal generation.
119033      C
119034      C
119035      COMMON /ATPAR3/ AIR(2),CAT(2),ECK(3),TNK(2),EGR(2)
119036      COMMON /ATPAR4/ CAN(2),PCV(2),CAP(2),EFF(2,3,15)
119037      COMMON /EGSCAL/ AER(11,11,2,2),TGS(11,6,4),EGS(7,2),OPENLP(20,4)
119038      COMMON /EVPDAT/ EVPAER(3,2),EVPTGS(3,2,4),CCEMI(7,4)
119039      C
119040      DIMENSION AIREGR(2)
119041      C
119042      C
119043      DO 56 IAY=1,2
119044      C
119045      DO 54 IPG=1,2
119046      C
119047      C Choose Air Pump or EGR effectiveness on pollutant group (IPG).
119048      C
119049      IF (IPG.EQ.1) AIREGR(IAY)=AIR(IAY)
119050      IF (IPG.EQ.2) AIREGR(IAY)=EGR(IAY)
119051      C
119052      C Region 1 calculations
119053      C Overlap between Catalyst Removal and Air Pump Tampering or
119054      C Overlap between Catalyst Removal and EGR Tampering
119055      C
119056      DIFF=AIREGR(IAY)-CAT(IAY)
119057      IF (DIFF.GE.0.0) GOTO 10

```


Appendix C: MOBILE4 Subroutine CALAER

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```

119058 C
119059     AER(1,8,IPG,IAY)=ABS(DIFF)
119060     AER(1,1,IPG,IAY)=1.00-CAT(IAY)
119061     GO TO 12
119062 C
119063     10 AER(1,9,IPG,IAY)=DIFF
119064     AER(1,1,IPG,IAY)=1.00-AIREGR(IAY)
119065 C
119066 C Region 2 calculations
119067 C Overlap between Air Pump Tampering & Fuel Inlet Tampering or
119068 C Overlap between EGR Tampering & Fuel Inlet Tampering
119069 C
119070     12 NCKIAY=IAY+1
119071 C
119072     DIFF=AIREGR(IAY)-ECK(NCKIAY)
119073     IF(DIFF.GE.O.O) GOTO 14
119074 C
119075     AER(2,8,IPG,IAY)=ABS(DIFF)
119076     AER(2,2,IPG,IAY)=1.00-ECK(NCKIAY)
119077     GO TO 16
119078 C
119079     14 AER(2,10,IPG,IAY)=DIFF
119080     AER(2,2,IPG,IAY)=1.00-AIREGR(IAY)
119081 C
119082 C Region 3 calculations
119083 C Overlap between Air Pump Tampering & Other Misfueling or
119084 C Overlap between EGR Tampering & Other Misfueling
119085 C
119086     16 DIFF=AIREGR(IAY)-TNK(IAY)
119087     IF(DIFF.GE.O.O) GOTO 18
119088 C
119089     AER(3,8,IPG,IAY)=ABS(DIFF)
119090     AER(3,3,IPG,IAY)=1.00-TNK(IAY)
119091     GO TO 20
119092 C
119093     18 AER(3,11,IPG,IAY)=DIFF
119094     AER(3,3,IPG,IAY)=1.00-AIREGR(IAY)
119095 C
119096 C Region 4 calculations
119097 C Overlap between Air Pump, Fuel Inlet & Catalyst Removal or
119098 C Overlap between EGR, Fuel Inlet & Catalyst Removal
119099 C
119100     20 NCKIAY=1
119101     IF(IAY.EQ.2) NCKIAY=3
119102 C
119103     DIFFA=AIREGR(IAY)-CAT(IAY)
119104     DIFFB=AIREGR(IAY)-ECK(NCKIAY)
119105     DIFFC=CAT(IAY)-ECK(NCKIAY)
119106 C
119107     IF(DIFFA.GE.O.O) GOTO 26
119108 C
119109     IF(DIFFB.LT.O.O) GOTO 22
119110 C
119111 C CAT > AIR > ECK .OR. CAT > EGR > ECK
119112 C
119113     AER(4,4,IPG,IAY)=1.00-CAT(IAY)
119114     AER(4,2,IPG,IAY)=ABS(DIFFA)
119115     AER(4,10,IPG,IAY)=DIFFB

```

Appendix C: MOBILE4 Subroutine CALAER

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```

119116      GO TO 32
119117      C
119118      22 IF(DIFFC.GE.0.0) GOTO 24
119119      C
119120      C ECK > CAT > AIR .OR. ECK > CAT > EGR
119121      C
119122      AER(4,4,IPG,IAY)=1.00-ECK(NCKIAY)
119123      AER(4,1,IPG,IAY)=ABS(DIFFC)
119124      AER(4,8,IPG,IAY)=ABS(DIFFA)
119125      GO TO 32
119126      C
119127      C CAT > ECK > AIR .OR. CAT > ECK > EGR
119128      C
119129      24 AER(4,4,IPG,IAY)=1.00-CAT(IAY)
119130      AER(4,2,IPG,IAY)=DIFFC
119131      AER(4,8,IPG,IAY)=ABS(DIFFB)
119132      GO TO 32
119133      C
119134      26 IF(DIFFB.GE.0.0) GOTO 28
119135      C
119136      C ECK > AIR > CAT .OR. ECK > EGR > CAT
119137      C
119138      AER(4,4,IPG,IAY)=1.00-ECK(NCKIAY)
119139      AER(4,1,IPG,IAY)=ABS(DIFFB)
119140      AER(4,9,IPG,IAY)=DIFFA
119141      GO TO 32
119142      C
119143      28 IF(DIFFC.GE.0.0) GOTO 30
119144      C
119145      C AIR > ECK > CAT .OR. EGR > ECK > CAT
119146      C
119147      AER(4,4,IPG,IAY)=1.00-AIREGR(IAY)
119148      AER(4,6,IPG,IAY)=DIFFB
119149      AER(4,9,IPG,IAY)=ABS(DIFFC)
119150      GO TO 32
119151      C
119152      C AIR > CAT > ECK .OR. EGR > CAT > ECK
119153      C
119154      30 AER(4,4,IPG,IAY)=1.00-AIREGR(IAY)
119155      AER(4,6,IPG,IAY)=DIFFA
119156      AER(4,10,IPG,IAY)=DIFFC
119157      C
119158      C Region 5 calculations
119159      C Overlap between Air Pump, Other Misfueling & Catalyst Removal or
119160      C Overlap between EGR, Other Misfueling & Catalyst Removal
119161      C
119162      32 DIFFA=AIREGR(IAY)-CAT(IAY)
119163      DIFFB=AIREGR(IAY)-TNK(IAY)
119164      DIFFC=CAT(IAY)-TNK(IAY)
119165      C
119166      IF(DIFFA.GE.0.0) GOTO 38
119167      C
119168      IF(DIFFB.LT.0.0) GOTO 34
119169      C
119170      C CAT > AIR > TNK .OR. CAT > EGR > TNK
119171      C
119172      AER(5,5,IPG,IAY)=1.00-CAT(IAY)
119173      AER(5,3,IPG,IAY)=ABS(DIFFA)

```

Appendix C: MOBILE4 Subroutine CALAER

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```

119174      AER(5,11,IPG,IAY)=DIFFB
119175      GO TO 44
119176      C
119177      34 IF(DIFFC.GE.0.0) GOTO 36
119178      C
119179      C TNK > CAT > AIR .OR. TNK > CAT > EGR
119180      C
119181      AER(5,5,IPG,IAY)=1.00-ECK(IAY)
119182      AER(5,1,IPG,IAY)=ABS(DIFFC)
119183      AER(5,8,IPG,IAY)=ABS(DIFFA)
119184      GO TO 44
119185      C
119186      C CAT > ECK > AIR .OR. CAT > ECK > EGR
119187      C
119188      36 AER(5,5,IPG,IAY)=1.00-CAT(IAY)
119189      AER(5,3,IPG,IAY)=DIFFC
119190      AER(5,8,IPG,IAY)=ABS(DIFFB)
119191      GO TO 44
119192      C
119193      38 IF(DIFFB.GE.0.0) GOTO 40
119194      C
119195      C ECK > AIR > CAT .OR. ECK > EGR > CAT
119196      C
119197      AER(5,5,IPG,IAY)=1.00-TNK(IAY)
119198      AER(5,1,IPG,IAY)=ABS(DIFFB)
119199      AER(5,9,IPG,IAY)=DIFFA
119200      GO TO 44
119201      C
119202      40 IF(DIFFC.GE.0.0) GOTO 42
119203      C
119204      C AIR > TNK > CAT .OR. EGR > TNK > CAT
119205      C
119206      AER(5,5,IPG,IAY)=1.00-AIREGR(IAY)
119207      AER(5,7,IPG,IAY)=DIFFB
119208      AER(5,9,IPG,IAY)=ABS(DIFFC)
119209      GO TO 44
119210      C
119211      C AIR > CAT > TNK .OR. EGR > CAT > TNK
119212      C
119213      42 AER(5,5,IPG,IAY)=1.00-AIREGR(IAY)
119214      AER(5,7,IPG,IAY)=DIFFA
119215      AER(5,11,IPG,IAY)=DIFFC
119216      C
119217      C Region 6 calculations
119218      C Overlap between Catalyst Removal and Fuel Inlet Tampering
119219      C
119220      44 NCKIAY=1
119221      IF(IAY.EQ.2) NCKIAY=3
119222      C
119223      DIFF=CAT(IAY)-ECK(NCKIAY)
119224      IF(DIFF.GE.0.0) GOTO 46
119225      C
119226      AER(6,9,IPG,IAY)=ABS(DIFF)
119227      AER(6,6,IPG,IAY)=1.00-ECK(NCKIAY)
119228      GO TO 48
119229      C
119230      46 AER(6,10,IPG,IAY)=DIFF
119231      AER(6,6,IPG,IAY)=1.00-CAT(IAY)

```

Appendix C: MOBILE4 Subroutine CALAER

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```
119232 C
119233 C Region 7 Calculations
119234 C Overlap between Catalyst Removal and Other Misfueling
119235 C
119236 48 DIFF=CAT(IAY)-TNK(IAY)
119237 IF(DIFF.GE.0.0) GOTO 50
119238 C
119239 AER(7,9,IPG,IAY)=ABS(DIFF)
119240 AER(7,7,IPG,IAY)=1.00-TNK(IAY)
119241 GO TO 52
119242 C
119243 50 AER(7,11,IPG,IAY)=DIFF
119244 AER(7,7,IPG,IAY)=1.00-CAT(IAY)
119245 C
119246 C Regions 8,9,10,&11 Calculations
119247 C
119248 C 8 : Air Pump or EGR Tampering Only
119249 C 9 : Catalyst Removal Only
119250 C 10 : Fuel Inlet Tampering Only
119251 C 11 : Other Misfueling Only
119252 C
119253 52 NCKIAY=IAY+1
119254 AER(8,8,IPG,IAY)=1.00-AIREGR(IAY)
119255 AER(9,9,IPG,IAY)=1.00-CAT(IAY)
119256 AER(10,10,IPG,IAY)=1.00-ECK(NCKIAY)
119257 AER(11,11,IPG,IAY)=1.00-TNK(IAY)
119258 C
119259 54 CONTINUE
119260 C
119261 C Evap. Canister, PCV, & Gas Cap calculations
119262 C
119263 EVPAER(1,IAY)=1.00-CAN(IAY)
119264 EVPAER(2,IAY)=1.00-PCV(IAY)
119265 EVPAER(3,IAY)=1.00-CAP(IAY)
119266 C
119267 56 CONTINUE
119268 C
119269 RETURN
119270 C
119271 END
```



```

120000      SUBROUTINE WTLRUL(INERR,*)
120001      C
120002      C WTLRUL weights together the 13 trip length cases for each running loss HC
120003      C instance of ITLR x ITLT x IGTL x IVTL, for both the base and tampering
120004      C rate tables.
120005      C
120006      C Called by ONESEC.
120007      C
120008      C Calls QUITER.
120009      C
120010      C Input on call:
120011      C
120012      C   parameter list: INERR
120013      C   common blocks:
120014      C   /FLAGS1/ PROMPT
120015      C   /IOUCOM/ IOUGEN,IOUASK
120016      C   /RUNLS1/ TLVMT,TLEMI,MAXTL
120017      C   /RUNLS2/ TLCAN,TLCAP
120018      C   /RUNLS4/ MAXRUL
120019      C
120020      C Output on return:
120021      C
120022      C   common blocks:
120023      C   /RUNLS1/ TLVMT
120024      C   /RUNLS3/ RULBAS,RULCAN,RULCAP
120025      C
120026      C Local array subscripts
120027      C
120028      C VMTFRC(3) - VMTFRC( IDC )
120029      C
120030      C Local variable / array dictionary:
120031      C
120032      C   Name      Type      Description
120033      C   ----      -
120034      C   IDC        I      driving cycle pointer: 1=NYCC, 2=LA-4, 3=HFET
120035      C   TLSUM       R      sum of the trip length VMT fractions
120036      C   VMTFRC      R      VMT fractions for NYCC, LA-4, and HFET; must sum to 1.0.
120037      C
120038      C Notes:
120039      C
120040      C WTLRUL was added for MOBILE4.
120041      C
120042      C
120043      C   INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
120044      C
120045      C   COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
120046      C   COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
120047      C   COMMON /RUNLS1/ TLVMT(13),TLEMI(13,4,4,4,4),MAXTL
120048      C   COMMON /RUNLS2/ TLCAN(13,4,4),TLCAP(13,4,4)
120049      C   COMMON /RUNLS3/ RULBAS(4,4,4,4),RULCAN(4,4),RULCAP(4,4)
120050      C   COMMON /RUNLS4/ MYGRUL(4,4),MAXRUL
120051      C
120052      C   DIMENSION VMTFRC(3)
120053      C
120054      C Read in alternate VMT fractions.
120055      C
120056      C   IF (PROMPT.EQ.2) WRITE(IOUASK,200)
120057      C   200 FORMAT('O','Enter the NYCC, LA-4 and HFET trip',

```


Appendix C: MOBILE4 Subroutine WTLRUL

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```

120058      *          ' length vmt fractions (3F6.4:)'
120059      READ(10UGEN,100,END=99,ERR=99) VMTFRC
120060      100 FORMAT(3F6.4)
120061      C
120062      C  Verify VMT fraction values and that they sum to 1.0.
120063      C
120064          TLSUM=0.0
120065          DO 10 IDC=1,3
120066              IF (VMTFRC(IDC).LT.0.0.OR.VMTFRC(IDC).GT.1.0)
120067                  * CALL QUITER(VMTFRC(IDC),0,999,INERR)
120068              TLSUM=TLSUM+VMTFRC(IDC)
120069      10 CONTINUE
120070          IF (TLSUM.NE.1.0) CALL QUITER(TLSUM,0,999,INERR)
120071      C
120072      C  Update the NYCC %VMT values
120073      C
120074          TLSUM=0.0
120075          DO 20 ITL=1,6
120076              TLSUM=TLSUM+TLVMT(ITL)
120077      20 CONTINUE
120078          DO 30 ITL=1,6
120079              TLVMT(ITL)=TLVMT(ITL)*VMTFRC(1)/TLSUM
120080      30 CONTINUE
120081      C
120082      C  Update the LA-4 %VMT values
120083      C
120084          TLSUM=0.0
120085          DO 40 ITL=7,12
120086              TLSUM=TLSUM+TLVMT(ITL)
120087      40 CONTINUE
120088          DO 50 ITL=7,12
120089              TLVMT(ITL)=TLVMT(ITL)*VMTFRC(2)/TLSUM
120090      50 CONTINUE
120091      C
120092      C  Update the HFET %VMT value
120093      C
120094          TLVMT(13)=VMTFRC(3)
120095      C
120096      C  Calculate the weighted g/mi running loss emissions
120097      C
120098          DO 60 IVTL=1,4
120099              DO 60 IGTL=1,MAXRUL
120100                  DO 60 ITLT=1,4
120101                      DO 60 ITLR=1,4
120102                          RULBAS(ITLR,ITLT,IGTL,IVTL)=0.0
120103                          DO 60 ITL=1,MAXTL
120104                              RULBAS(ITLR,ITLT,IGTL,IVTL)=RULBAS(ITLR,ITLT,IGTL,IVTL)+
120105                                  * TLVMT(ITL)*TLEMI(ITL,ITLR,ITLT,IGTL,IVTL)
120106      60 CONTINUE
120107      C
120108      C  Calculate the weighted g/mi tampered running loss emissions for
120109      C  canister disconnect and gas cap removal
120110      C
120111          DO 70 ITLT=1,4
120112              DO 70 ITLR=1,4
120113                  RULCAN(ITLR,ITLT)=0.0
120114                  RULCAP(ITLR,ITLT)=0.0
120115          DO 70 ITL=1,MAXTL

```

Appendix C: MOBILE4 Subroutine WTLRUL

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```
120116      RULCAN(ITLR,ITLT)=RULCAN(ITLR,ITLT)+  
120117      *      TLVMT(ITL)*TLCAN(ITL,ITLR,ITLT)  
120118      RULCAP(ITLR,ITLT)=RULCAP(ITLR,ITLT)+  
120119      *      TLVMT(ITL)*TLCAP(ITL,ITLR,ITLT)  
120120      70 CONTINUE  
120121      C  
120122      99 RETURN  
120123      END
```

Appendix C: MOBILE4 Subroutine CEVTPD

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```
121000      SUBROUTINE CEVTPD
121001      C
121002      C CEVTPD calculates trips per day by the type and relative (to ICY) age of
121003      C the vehicle. The formula uses the intercept and slope data of the stored
121004      C tpd on type/age regression model. Since relative age is used, one set
121005      C of rates is calculated for use on all scenarios of the run.
121006      C
121007      C Called by ONESEC.
121008      C
121009      C Input on call:
121010      C
121011      C common blocks:
121012      C /MAXIMA/ MAXVEH,MAXYRS
121013      C /TPDCOM/ TPDCO
121014      C
121015      C Output on return:
121016      C
121017      C common blocks:
121018      C /CEVBMV/ BMYTPD
121019      C
121020      C Notes:
121021      C
121022      C CEVTPD was added for MOBILE4.
121023      C
121024      C
121025      COMMON /CEVBMV/ BMYMPD (20,8) ,BMYTPD (20,8)
121026      COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
121027      COMMON /TPDCOM/ TPDCO (2,8)
121028      C
121029      DO 10 IV=1,MAXVEH
121030      DO 10 JDX=1,MAXYRS
121031      BMYTPD (JDX, IV) =TPDCO (1, IV) - (TPDCO (2, IV) *JDX)
121032      10 CONTINUE
121033      C
121034      RETURN
121035      END
```

```

122000      SUBROUTINE GETNAT(INERR,*)
122001      C
122002      C GETNAT reads in and processes refueling loss related HC parameters
122003      C that are to apply nationwide - that is, to all scenarios of the run.
122004      C
122005      C Called by ONESEC.
122006      C
122007      C Calls YRTEST.
122008      C
122009      C Input on call:
122010      C
122011      C   common blocks:
122012      C   /CITRV2/ RVP115
122013      C   /FLAGS1/ PROMPT
122014      C   /FLAGS3/ RLFLAG
122015      C   /IOUCOM/ IOUGEN, IOUASK
122016      C   /YEARS4/ IY2020
122017      C
122018      C Output on return:
122019      C
122020      C   parameter list: INERR
122021      C   common blocks:
122022      C   /RLCOM2/ IOBMY, IVOB, IS2SY, NPHASE, S2EFF
122023      C
122024      C Local variable / array dictionary:
122025      C
122026      C   Name      Type      Description
122027      C   -----
122028      C LOWVYR      I      lowest allowed S2 or ob vrs installation start year
122029      C PCTEL       I      percent efficiency of S2 vrs in reducing LDGV/T refueling loss
122030      C PCTEH       I      percent efficiency of S2 vrs in reducing HDGV refueling loss
122031      C
122032      C Notes:
122033      C
122034      C GETNAT was added for MOBILE4.
122035      C
122036      C
122037      C   INTEGER PROMPT, TAMFLG, SPDFLG, VMFLAG
122038      C   INTEGER ATPFLG, TPDFLG, RLFLAG, TEMFLG, OUTFMT
122039      C
122040      C   COMMON /CITRV2/ RVPHS1, RVPHS2, RVPET1, RVPET2, RVP090, RVP100, RVP115
122041      C   COMMON /FLAGS1/ PROMPT, TAMFLG, SPDFLG, VMFLAG
122042      C   COMMON /FLAGS3/ ATPFLG, TPDFLG, RLFLAG, LOCFLG, TEMFLG, OUTFMT
122043      C   COMMON /IOUCOM/ IOUIMD, IOUGEN, IOUREP, IOUERR, IOUASK
122044      C   COMMON /RLCOM2/ IOBMY, IVOB(4), IS2SY, NPHASE, S2EFF(4)
122045      C   COMMON /YEARS4/ IY1941, IY1960, IY2020
122046      C
122047      C   DATA LOWVYR/1989/
122048      C
122049      C If uncontrolled losses or no refueling losses are selected, then skip
122050      C the next section.
122051      C
122052      C   IF (RLFLAG.EQ.1.OR.RLFLAG.EQ.5) GOTO 30
122053      C
122054      C Vapor Recovery Systems (vrs) input parameters section:
122055      C
122056      C Stage II vrs input: start year, no. of phase-in years & percent efficiency
122057      C for LDG & HDG are entered.

```

Appendix C: MOBILE4 Subroutine GETNAT

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```

122058 C
122059 IF (RLFLAG.EQ.3) GOTO 10
122060 C
122061 IF (PROMPT.EQ.2) WRITE (IOUASK,200)
122062 200 FORMAT('O','Enter Stage II VRS parameters -'/
122063 * ' ','start year, # phase-in years, LDG & HDG % efficiency:')
122064 READ (IOUGEN,100,END=99) IS2SY,NPHASE,PCTEL,PCTEH
122065 100 FORMAT (12,1X,11,2(1X,F3.0))
122066 C
122067 CALL YRTEST (IS2SY,87,LOWVYR,IY2020,INERR)
122068 IF (NPHASE.EQ.0) CALL QUITER (0.,NPHASE,86,INERR)
122069 IF (PCTEL.LT.0.0.OR.PCTEL.GT.100.0) CALL QUITER (PCTEL,1,99,INERR)
122070 IF (PCTEH.LT.0.0.OR.PCTEH.GT.100.0) CALL QUITER (PCTEH,2,99,INERR)
122071 C
122072 S2EFF (1)=PCTEL/100.
122073 S2EFF (2)=S2EFF (1)
122074 S2EFF (3)=S2EFF (2)
122075 S2EFF (4)=PCTEH/100.
122076 IF (RLFLAG.EQ.2) GOTO 30
122077 C
122078 C Users specifies onboard vrs controlled refueling losses. The user must
122079 C supply the start year for controls and which vehicle classes are to be
122080 C covered.
122081 C
122082 10 IF (PROMPT.EQ.2) WRITE (IOUASK,210)
122083 210 FORMAT('O','Enter onboard vrs first model year & vehicle classes',
122084 * ' (12,1X,411):')
122085 READ (IOUGEN,110,END=99) IOBMV,IVOB
122086 110 FORMAT (12,1X,411)
122087 C
122088 CALL YRTEST (IOBMV,87,LOWVYR,IY2020,INERR)
122089 C
122090 DO 20 IVTAM=1,4
122091 IF (IVOB (IVTAM) .LT.1.OR.IVOB (IVTAM) .GT.2)
122092 * CALL QUITER (0.,IVOB (IVTAM),84,INERR)
122093 20 CONTINUE
122094 C
122095 C RLFLAG one-time data processing is completed.
122096 C
122097 30 RETURN
122098 C
122099 C eof RETURN: ran out of input data before GETNAT call completed.
122100 C
122101 99 RETURN1
122102 END

```



```

123000      SUBROUTINE RDCITY(INERR,*)
123001      C
123002      C RDCITY reads in the scenario's city specific parameters record. The fields
123003      C are: city name, minimum/maximum fuel temperatures, three types of fuel
123004      C RVP levels, in-use RVP controls start year, and fuel supply fractions of
123005      C ethanol & methanol blends. The methanol & ethanol fields are commented out.
123006      C The ASTM RVP is entered as a class code and RDCITY maps it to the correct
123007      C RVP level. RDCITY assigns the RVP limits based on the max and min
123008      C temperatures.
123009      C
123010      C Called by ONESEC and LOCAL.
123011      C
123012      C Calls QUITER.
123013      C
123014      C Input on call:
123015      C
123016      C   common blocks:
123017      C   /CITRV3/ RVPMAP,AClass
123018      C   /FLAGS1/ PROMPT
123019      C   /IOUCOM/ IOUGEN
123020      C   /RVPNAT/ RVPLIM
123021      C
123022      C Output on return:
123023      C
123024      C   common block:
123025      C   /CITPAR/ SCNAME,(in-house vsn only: FRETH,FRMETH)
123026      C   /CITRV1/ RVPBAS,RVPIUS,RVPAST,IUSESY
123027      C   /CITRV3/ ICLASS,ASTMCL
123028      C   /RVPNAT/ RVPDIU
123029      C   /TEMPS/ TEMMIN,TEMMAX
123030      C
123031      C Local variable / array dictionary:
123032      C
123033      C   Name      Type      Description
123034      C   -----
123035      C   LOWUYR    I        lowest allowed in-use RVP controls start year
123036      C   UBETH     R        upper bound on acceptable range of values for ethanol fraction
123037      C   UBMETH    R        upper bound on acceptable range of values for meth. fraction
123038      C
123039      C RDCITY was added for MOBILE4.
123040      C RDCITY was modified in MOBILE4.
123041      C
123042      C
123043      C   CHARACTER*4 SCNAME
123044      C   CHARACTER*1 ASTMCL,AClass
123045      C   INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
123046      C
123047      C   COMMON /CITPAR/ SCNAME(4),FRETH,FRMETH,FRGAS
123048      C   COMMON /CITRV1/ RVPBAS,RVPIUS,RVPAST,RVPICY,RVPETH,IUSESY,RATUNC
123049      C   COMMON /CITRV3/ RVPMAP(5),RVPX(2,2),IClass,ASTMCL,AClass(5)
123050      C   COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
123051      C   COMMON /IOUCOM/ IOUIDM,IOUGEN,IOUREP,IOUERR,IOUASK
123052      C   COMMON /RVPNAT/ ICERSY,RVPCER,RVPLIM(2),RVPDIU(2),PFUL,EINCR
123053      C   COMMON /TEMPS/ AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
123054      C   COMMON /YEARS4/ IY1941,IY1960,IY2020
123055      C
123056      C   UBMETH is 0.100001 instead of .10 due to difference between compiled
123057      C   (.9999996E-01) and read in (.100000024) internal representations of .10 .

```

```

123058 C
123059 DATA UBETH/0.50/,UBMETH/0.100001/,LOWUYR/1970/
123060 C
123061 C Post-release in-house version will restore oxygenated fuel supply input
123062 C fields by appending 2 F4.2 fields after IUSESY and uncommenting (CC to ' ')
123063 C the corresponding range checks in this routine and the output echo in OUTLAP.
123064 C The default market shares of 0.00 eliminate oxygenated fuels role in ef
123065 C calculation without any code change.
123066 C
123067 IF (PROMPT.EQ.2) WRITE (IOUASK,200)
123068 200 FORMAT('0','Enter scenario name, ASTM class, min & max daily',
123069 * ' temps, base & in-use RVP, in-use start year:')
123070 READ (IOUGEN,100,END=99) (SCNAME(I),I=1,4),ASTMCL,TEMMIN,TEMMAX,
123071 * RVPBAS,RVPIUS,IUSESY
123072 100 FORMAT(4A4,1X,A1,2F5.0,2F5.1,1X,12)
123073 C
123074 C Round the minimum and maximum temperatures to the nearest 0.1F.
123075 C
123076 TEMMIN=FLOAT (IFIX (TEMMIN*10.+5))/10.
123077 TEMMAX=FLOAT (IFIX (TEMMAX*10.+5))/10.
123078 C
123079 C Check temperature ranges. These bounds are for catching data entry errors
123080 C only. What constitutes reasonable min & max temperature values depends on
123081 C local conditions, especially AMBT.
123082 C
123083 IF (TEMMIN.LT.0.0.OR.TEMMIN.GT.100.0)
123084 * CALL QUITER (TEMMIN,1,91,INERR)
123085 C
123086 IF (TEMMAX.LT.0.0.OR.TEMMAX.GT.120.0)
123087 * CALL QUITER (TEMMAX,2,91,INERR)
123088 C
123089 IF (TEMMAX.LT.TEMMIN) CALL QUITER (TEMMAX,0,92,INERR)
123090 C
123091 C Identify and match ASTM RVP. If no match, assign Class C to allow input
123092 C processing to proceed (EFCALX/OUTPUT will be skipped, since INERR > 0).
123093 C
123094 DO 10 ICLASS=1,5
123095 IF (ASTMCL.EQ.ACLASS(ICLASS)) GOTO 20
123096 10 CONTINUE
123097 CALL QUITER (0.,0,94,INERR)
123098 ICLASS=3
123099 20 RVPAST=RVPMAP (ICLASS)
123100 C
123101 C Compute diurnal evap RVP limits. Upper bound is dependent on max and min
123102 C temperatures. Lower bound may also have such dependency, so
123103 C assignment is made here.
123104 C
123105 RVPDIU(1)=RVPLIM(1)
123106 C
123107 IF (TEMMIN.LE.95.) RVPDIU(2)=26.823-0.004781*TEMMIN-0.13407*TEMMAX
123108 IF (TEMMIN.GT.95.) RVPDIU(2)=26.000-0.004781*TEMMIN-0.13407*TEMMAX
123109 IF (RVPDIU(2).GT.RVPLIM(2)) RVPDIU(2)=RVPLIM(2)
123110 C
123111 C Check RVPs and re-assign if necessary.
123112 C
123113 IF (RVPBAS.LT.RVPLIM(1)) CALL QUITER (RVPLIM(1),1,90,INERR)
123114 IF (RVPBAS.LT.RVPLIM(1)) RVPBAS=RVPLIM(1)
123115 C

```

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Appendix C: MOBILE4 Subroutine RDCITY

```
123116 IF (RVPBAS.GT.RVPLIM(2)) CALL QUITER(RVPLIM(2),1,90,INERR)
123117 IF (RVPBAS.GT.RVPLIM(2)) RVPBAS=RVPLIM(2)
123118 C
123119 IF (RVPIUS.LT.RVPLIM(1)) CALL QUITER(RVPLIM(1),2,90,INERR)
123120 IF (RVPIUS.LT.RVPLIM(1)) RVPIUS=RVPLIM(1)
123121 C
123122 IF (RVPIUS.GT.RVPLIM(2)) CALL QUITER(RVPLIM(2),2,90,INERR)
123123 IF (RVPIUS.GT.RVPLIM(2)) RVPIUS=RVPLIM(2)
123124 C
123125 C Convert in-use start year to 4 digit no. & then check if in range.
123126 C
123127 CALL YRTEST(IUSESY,87,LOWUYR,IY2020,INERR)
123128 C
123129 C Check blend fractions and assign residual gasoline fraction.
123130 C
123131 CC IF (FRETH.LT.0.0.OR.FRETH.GT.UBETH)
123132 CC * CALL QUITER(FRETH,1,93,INERR)
123133 CC IF (FRMETH.LT.0.0.OR.FRMETH.GT.UBMETH)
123134 CC * CALL QUITER(FRMETH,2,93,INERR)
123135 FRGAS=1.0-(FRETH+FRMETH)
123136 C
123137 RETURN
123138 C
123139 C Logical end of input file occurred on read attempt: stop the MOBILE4 run.
123140 C
123141 99 RETURN1
123142 END
```

```
124000      SUBROUTINE PARSEC(ICY,INERR,*)
124001      C
124002      C PARSEC reads in the Parameter Section variables and validates them.
124003      C
124004      C Called by MAIN.
124005      C
124006      C Calls GETALH, GETSC1, GETVMT and LOCAL.
124007      C
124008      C Input on call:
124009      C
124010      C   parameter list: INERR
124011      C   common blocks:
124012      C   /FLAGS1/ VMFLAG
124013      C
124014      C Output on return:
124015      C
124016      C   parameter list: ICY,INERR
124017      C
124018      C PARSEC was modified in MOBILE4 to move the first scenario and BIGALH input
124019      C code into GETSC1 and GETALH, respectively.
124020      C
124021      C
124022      C   INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
124023      C
124024      C   COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
124025      C
124026      C PARSEC is called once for each scenario of the run.
124027      C
124028      C Get the first required scenario record.
124029      C
124030      C   CALL GETSC1(ICY,INERR,*99)
124031      C
124032      C Read in and process the second required scenario record. This record
124033      C and the parameters calculated from it supply all the local (city specific)
124034      C data needed for the current scenario.
124035      C
124036      C   CALL LOCAL(ICY,INERR,*99)
124037      C
124038      C Check for user supplied vmt mix to be used for this scenario only.
124039      C
124040      C   IF (VMFLAG.EQ.2) CALL GETVMT(INERR,*99)
124041      C
124042      C Here read in BIGALH parameters.
124043      C
124044      C   CALL GETALH(INERR,*99)
124045      C
124046      C   RETURN
124047      C
124048      C EOF on any attempted read => take alternate return 1 => run aborts.
124049      C End of run record => take alternate return => stop run (normal termination)
124050      C
124051      99 RETURN
124052      END
```



```

125000      SUBROUTINE GETSC1(ICY,INERR,*)
125001      C
125002      C GETSC1 reads in and validates the 1st required scenario parameter record.
125003      C
125004      C Called by PARSEC.
125005      C
125006      C Calls FLOAT, IFIX, QUITER and YRTEST. FLOAT & IFIX are FORTRAN library
125007      C functions.
125008      C
125009      C Input on call:
125010      C
125011      C     parameter list: INERR
125012      C     common blocks:
125013      C     /FLAGS1/ PROMPT,SPDFLG,VMFLAG
125014      C     /FLAGS2/ IMFLAG
125015      C     /IMPAR2/ NUDATA
125016      C     /IOUCOM/ IOUGEN,IOUASK
125017      C     /MAXIMA/ MAXVEH
125018      C     /REGION/ FEET
125019      C     /YEARS4/ IY1960,IY2020
125020      C
125021      C Output on return:
125022      C
125023      C     parameter list: ICY,INERR
125024      C     common blocks:
125025      C     /REGION/ IREJN,ALT
125026      C     /SCENE1/ SPD,PCCN,PCHC,PCCC
125027      C     /TEMPS/ AMBT
125028      C
125029      C Local variable dictionary:
125030      C
125031      C      Name      Type      Description
125032      C      -----
125033      C      NSPDS      I      number of speeds entered by user for current scenario:
125034      C                      SPDFLG = 1 => NSPDS = 1; SPDFLG = 2 => NSPDS = 8
125035      C      OPCHK1      R      operating modes check 1: 0.0 <= PCHC + PCCC <= 100.
125036      C      OPCHK2      R      operating modes check 2: 0.0 <= PCHC + PCCC - PCCN <= 100.
125037      C
125038      C GETSC1 was added for MOBILE4.
125039      C GETSC1 was modified in MOBILE4. AMBT is rounded to the
125040      C nearest 0.1F.
125041      C
125042      C
125043      C      CHARACTER*4 IMNAME
125044      C
125045      C      INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
125046      C      INTEGER ALHFLG
125047      C
125048      C      COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
125049      C      COMMON /FLAGS2/ MYMFLG,NEWFLG,IMFLAG,ALHFLG
125050      C      COMMON /IMPAR2/ ILDT(4),ITEST,NUDATA(2),NONUDA,NLIM,IMNAME(20,9)
125051      C      COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
125052      C      COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
125053      C      COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
125054      C      COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
125055      C      COMMON /TEMPS/ AMBT,TEMMIN,TEMMA,TEMEXH(3),TEMEVP(6),TEMAST(3)
125056      C      COMMON /YEARS4/ IY1941,IY1960,IY2020
125057      C

```


Appendix C: MOBILE4 Subroutine GETSC1

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```

125058 C GETSC1 is called once for each scenario of the run.
125059 C
125060 C Get the first required scenario record.
125061 C
125062 IF (SPDFLG.EQ.2) GOTO 20
125063 NSPDS=1
125064 IF (PROMPT.EQ.2) WRITE (10UASK,200)
200 FORMAT('O','Enter region, CY,SPD(1),AMBT,PCCN,PCHC,PCCC: ')
125066 READ (10UGEN,100,END=99) IREJN,ICY,SPD(1),AMBT,PCCN,PCHC,PCCC
125067 100 FORMAT(11,1X,12,5(1X,F4.1))
125068 C
125069 DO 10 IV=2,MAXVEH
125070 SPD(IV)=SPD(1)
125071 10 CONTINUE
125072 GOTO 30
125073 C
125074 20 NSPDS=MAXVEH
125075 IF (PROMPT.EQ.2) WRITE (10UASK,220)
220 FORMAT('O','Enter region, CY,SPD(8),AMBT,PCCN,PCHC,PCCC: ')
125076 READ (10UGEN,120,END=99) IREJN,ICY,SPD,AMBT,PCCN,PCHC,PCCC
125077 120 FORMAT(11,1X,12,12(1X,F4.1))
125078 C
125079 C Check for "end of run" record, a row of 60 zeroes. This record acts as
125080 C visible break between 2 input streams, providing dummy values for all first
125081 C scenario record fields and leaving the file pointer at the first record of
125082 C the next input stream. Multiple input streams in a single file or a set of
125083 C concatenated files could occur in using MOBILE4 as a subroutine, for example.
125084 C A normal end of run also occurs, of course, when the first scenario record
125085 C read encounters an end of file marker.
125086 C
125087 30 IF (IREJN.EQ.0) GOTO 99
125088 C
125089 C Otherwise, validate inputs.
125090 C
125091 IF (IREJN.LT.1.OR.IREJN.GT.2) CALL QUITER(0.,IREJN,24,INERR)
125092 C
125093 C If high altitude run, then hi-alt. I/M credits must be supplied for all my.
125094 C Can not use NONUDA, since it only checks if at least one (not necessarily
125095 C every) I/M credits array is replaced by the user.
125096 C
125097 IF (IREJN.EQ.2.AND.IMFLAG.EQ.2.AND.NUDATA(1).EQ.1)
125098 * CALL QUITER(0.,0,102,INERR)
125099 C
125100 C ICY read in as last 2 digits of calendar year. Call YRTEST to both
125101 C convert the value to a 4 digit year and validate the result is in-range.
125102 C
125103 CALL YRTEST(ICY,38,1Y1960,1Y2020,INERR)
125104 C
125105 C Check input speed(s).
125106 C
125107 C
125108 DO 40 IV=1,NSPDS
125109 IF (SPD(IV).LE.0.0) CALL QUITER(SPD(IV),0,39,INERR)
125110 IF (SPD(IV).GT.0.0.AND.SPD(IV).LT.2.5)
125111 * CALL QUITER(SPD(IV),0,52,INERR)
125112 IF (SPD(IV).GT.0.0.AND.SPD(IV).LT.2.5) SPD(IV)=2.5
125113 IF (SPD(IV).GT.55.0) CALL QUITER(SPD(IV),0,96,INERR)
125114 IF (SPD(IV).GT.55.0) SPD(IV)=55.0
125115 40 CONTINUE

```

```
125116 C
125117      AMBT=FLOAT (IFIX (AMBT*10.+5))/10.
125118      IF (AMBT.LT.0.0.OR.AMBT.GT.110.0) CALL QUITER (AMBT,0,40,INERR)
125119      IF (PCCN.LT.0.0.OR.PCCN.GT.100.0) CALL QUITER (PCCN,0,41,INERR)
125120      IF (PCHC.LT.0.0.OR.PCHC.GT.100.0) CALL QUITER (PCHC,0,42,INERR)
125121      IF (PCCC.LT.0.0.OR.PCCC.GT.100.0) CALL QUITER (PCCC,0,43,INERR)
125122      OPCHK1=PCHC+PCCC
125123      IF (OPCHK1.LT.0.0.OR.OPCHK1.GT.100.0)
125124      *   CALL QUITER (OPCHK1,0,63,INERR)
125125      OPCHK2=OPCHK1-PCCN
125126      IF (OPCHK2.LT.0.0.OR.OPCHK2.GT.100.0)
125127      *   CALL QUITER (OPCHK2,0,64,INERR)
125128 C
125129 C   Assign altitude in feet corresponding to selected (low,high) region.
125130 C
125131      ALT=FEET (IREJN)
125132 C
125133      RETURN
125134 C
125135 C   EOF on any attempted read => take alternate return 1 => run aborts.
125136 C
125137 99 RETURN1
125138      END
```

```

126000      SUBROUTINE LOCAL(ICY,INERR,*)
126001      C
126002      C LOCAL initializes the local (city specific) data common blocks.
126003      C
126004      C Called by PARSEC.
126005      C
126006      C Calls CALUDI, CALTEM, QUITER and RDCITY.
126007      C
126008      C Input after call to RDCITY:
126009      C
126010      C   parameter list: ICY
126011      C   common blocks:
126012      C   /CITPAR/ FRETH
126013      C   /CITRV1/ RVPBAS,RVPIUS,RVPAST,IUSESY
126014      C   /CITRV2/ ASTRUB
126015      C   /CITRV3/ ICLASS
126016      C   /FLAGS3/ LOCFLG
126017      C   /RVPNAT/ ICERSY,RVPCER,RVPLIM,RVPDIU,PFUL,EINCR
126018      C   /TEMPS/ AMBT,TEMMIN,TEMMAX,TEMEVP
126019      C
126020      C Output on return:
126021      C
126022      C   parameter list: INERR
126023      C   common blocks:
126024      C   /CITCIN/ UDI,CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW
126025      C   /CITRV1/ RVPICY,RVPETH,RATUNC
126026      C   /CITRV2/ RVPHS
126027      C   /CITRV3/ RVPX
126028      C
126029      C RVPHS(2,2) = RVPHS ( ICER, IFUEL ) = RVPHS1,RVPHS2,RVPET1,RVPET2
126030      C ASTRUB(3) = ASTRUB ( ICLASS ) = RVP090,RVP100,RVP115
126031      C
126032      C Local variable / array dictionary:
126033      C
126034      C   Name      Type      Description
126035      C   -----
126036      C   RVPLOS    R        RVP loss due to weathering
126037      C   RVPMIN    R        minimum RVP allowed in uncontrolled RVP adjustment calculation
126038      C   RVPUNC    R        RVP for adjusting uncontrolled refueling loss rates for RVP
126039      C   UNITY    R        no adjustment case (neutral multiplier = 1.0) for RATUNC
126040      C
126041      C Notes:
126042      C
126043      C LOCAL was added in MOBILE4.
126044      C LOCAL was modified in MOBILE4.
126045      C
126046      C
126047      C   CHARACTER*4 SCNAME
126048      C   CHARACTER*1 ASTMCL,AClass
126049      C   INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
126050      C
126051      C   COMMON /CITCIN/ UDI(5),IUDI,CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW
126052      C   COMMON /CITPAR/ SCNAME(4),FRETH,FRMETH,FRGAS
126053      C   COMMON /CITRV1/ RVPBAS,RVPIUS,RVPAST,RVPICY,RVPETH,IUSESY,RATUNC
126054      C   COMMON /CITRV2/ RVPHS(2,2),ASTRUB(3)
126055      C   COMMON /CITRV3/ RVPMAP(5),RVPX(2,2),IClass,ASTMCL,AClass(5)
126056      C   COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
126057      C   COMMON /RVPNAT/ ICERSY,RVPCER,RVPLIM(2),RVPDIU(2),PFUL,EINCR

```

```

126058      COMMON /TEMPS/  AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
126059      C
126060      DATA RVPMIN/7.0/,UNITY/1.0/
126061      C
126062      C Read in and validate the second required scenario record, which contains
126063      C the user supplied local data, if the user has not already provided this
126064      C information in one-time data.
126065      C
126066      IF (LOCFLG.EQ.1) CALL RDCITY(INERR,*99)
126067      C
126068      C At this point, regardless of LOCFLG, AMBT, TEMMIN & TEMMAX have been read in.
126069      C Check if AMBT is within the (TEMMIN,TEMMAX) range and then calculate
126070      C the exhaust and evaporative temperatures.
126071      C
126072      IF (AMBT.LT.TEMMIN.OR.AMBT.GT.TEMMAX) CALL QUITER (AMBT,0,95,INERR)
126073      C
126074      CALL CALTEM
126075      C
126076      C Set RVP related parameters.
126077      C
126078      C The evaluation year affects the RVP(s) to be used for this scenario:
126079      C
126080      IF (ICY.LT.ICERSY) ICERSW=1
126081      IF (ICY.GE.ICERSY) ICERSW=2
126082      IF (ICY.LT.IUSESY) RVPICY=RVPBAS
126083      IF (ICY.GE.IUSESY) RVPICY=RVPBUS
126084      C
126085      C Apply weathering to the in-use RVP. Equation uses the calculated Hot
126086      C Soak temperature. Check that this weathered RVP is within limits,
126087      C reset and warn if necessary.
126088      C
126089      RVPLOS=-2.4908+0.026196*TEMEVP(1)+0.00076898*RVPICY*TEMEVP(1)
126090      C
126091      IF (RVPLOS.LT.0.0) RVPLOS=0.0
126092      C
126093      RVPICY=RVPICY-RVPLOS
126094      C
126095      IF (RVPICY.LT.RVPDIU(1)) CALL QUITER (RVPDIU(1),4,90,INERR)
126096      IF (RVPICY.LT.RVPDIU(1)) RVPICY=RVPDIU(1)
126097      C
126098      IF (RVPICY.GT.RVPDIU(2)) CALL QUITER (RVPDIU(2),4,90,INERR)
126099      IF (RVPICY.GT.RVPDIU(2)) RVPICY=RVPDIU(2)
126100      C
126101      C Calculate Uncontrolled Diurnals (UDI) for these conditions:
126102      C 1 = FTP, 2 = In-Use, 3 = 8AM-11AM, 4 = 10AM-3PM, 5 = 8AM-2PM
126103      C
126104      UDI(1)=CALUDI (ASTRUB(1),      60.,      84., 40.)
126105      UDI(2)=CALUDI (RVPICY,  TEMMIN,  TEMMAX,PFUL)
126106      UDI(3)=CALUDI (RVPICY,TEMEVP(3),TEMEVP(4),PFUL)
126107      UDI(4)=CALUDI (RVPICY,TEMEVP(4),  TEMMAX,PFUL)
126108      UDI(5)=CALUDI (RVPICY,TEMEVP(3),TEMEVP(5),PFUL)
126109      C
126110      C Calculate up to 4 indexes for the diurnal equations, depending on the
126111      C cert switch and the ethanol fraction.
126112      C
126113      CIGAS1=UDI(2)/UDI(1)
126114      IF (ICERSW.EQ.2) CIGAS2=UDI(2)/CALUDI (RVPICER,60.,84.,40.)
126115      C

```


Appendix C: MOBILE4 Subroutine LOCAL

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```

126116      IF (FRETH.EQ.O.O) GOTO 10
126117      RVPETH=RVPICY+EINCR
126118      C
126119      C Ethanol's Wade Indices will be higher than gasoline's, since it uses the
126120      C same cert RVP in the denominator calculation, but the EINCR higher base/
126121      C in-use RVP in the numerator calculation.
126122      C
126123      CIETH1=CALUDI (RVPETH,TEMMIN,TEMMAX,PFUL)/UDI (1)
126124      IF (ICERSW.EQ.2) CIETH2=CALUDI (RVPETH,TEMMIN,TEMMAX,PFUL)
126125      *                                     /CALUDI (RVPCER,60.,84.,40.)
126126      C
126127      C Assign the 4 hot soak RVPs (gas/meth vs ethanol X non-cert vs cert).
126128      C
126129      10 RVPHS (1,1)=RVPICY
126130      RVPHS (2,1)=RVPICY*(ASTRUB (1)/RVPCER)
126131      C
126132      RVPHS (1,2)=RVPETH
126133      RVPHS (2,2)=RVPETH*(ASTRUB (1)/RVPCER)
126134      C
126135      C Next generate the 4 RVP exhaust effect RVPs. These are the same as the 4
126136      C hot soak RVPs.
126137      C
126138      DO 20 IFUEL=1,2
126139      DO 20 ICER=1,2
126140      RVPX (ICER,IFUEL)=RVPHS (ICER,IFUEL)
126141      20 CONTINUE
126142      C
126143      C Compute the RVP ratio to be used to adjust uncontrolled refueling loss rates
126144      C for in-use RVP controls, if controls are in effect during ICY.
126145      C Note that RVPUNC is reset if it is out of bounds.
126146      C
126147      RATUNC=UNITY
126148      IF (IUSES.YGT.ICY) GOTO 30
126149      RVPUNC=ASTRUB (3) - (RVPAST-RVPIUS)
126150      IF (RVPUNC.LT.RVPLIM (1)) CALL QUITER (RVPLIM (1),3.90,INERR)
126151      IF (RVPUNC.LT.RVPLIM (1)) RVPUNC=RVPLIM (1)
126152      IF (RVPUNC.GT.RVPLIM (2)) CALL QUITER (RVPLIM (2),3.90,INERR)
126153      IF (RVPUNC.GT.RVPLIM (2)) RVPUNC=RVPLIM (2)
126154      IF (RVPUNC.GE.ASTRUB (3)) RATUNC=UNITY
126155      IF (RVPUNC.LE.RVPMIN) RATUNC=RVPMIN/ASTRUB (3)
126156      IF (RVPMIN.LT.RVPUNC.AND.RVPUNC.LT.ASTRUB (3))
126157      *   RATUNC=RVPUNC/ASTRUB (3)
126158      C
126159      30 RETURN
126160      C
126161      C EOF on any attempted read => take alternate return 1 => run aborts.
126162      C
126163      99 RETURN
126164      END

```



```

127000      SUBROUTINE CALTEM
127001      C
127002      C CALTEM calculates exhaust and evaporative temperatures.
127003      C
127004      C Called by RDCITY.
127005      C
127006      C Calls OUTPOL and QUITER.
127007      C
127008      C Input on call:
127009      C
127010      C   common blocks:
127011      C   /CITRV3/ ICLASS
127012      C   /FLAGS3/ TEMFLG
127013      C   /MAXIMA/ MAXPOL
127014      C   /TEMPS/ AMBT,TEMMIN,TEMMA
127015      C
127016      C Output on return:
127017      C
127018      C   common block:
127019      C   /TEMPS/ TEMEXH,TEMEVP,TEMA
127020      C
127021      C Notes:
127022      C
127023      C CALTEM was added for MOBILE4.
127024      C
127025      C Local variable / array dictionary:
127026      C
127027      C   Name      Type      Description
127028      C   -----
127029      C   ITEM      I        QUITER temperature name number
127030      C   TRISE     R        temperature rise term common to many equations
127031      C
127032      C
127033      C   CHARACTER*1 ASTMCL,AClass
127034      C   INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
127035      C
127036      C   COMMON /CITRV3/ RVPMap(5),RVPX(2,2),IClass,ASTMCL,AClass(5)
127037      C   COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
127038      C   COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
127039      C   COMMON /TEMPS/ AMBT,TEMMIN,TEMMA,TEMEXH(3),TEMEVP(6),TEMA(3)
127040      C
127041      C Determine pollutants.
127042      C
127043      C   CALL OUTPOL(IP1,IP2)
127044      C
127045      C Compute the temperature rise term.
127046      C Warn user that diurnal evap efs may be inaccurate if TRISE>40F.
127047      C
127048      C   TRISE=TEMMA-TEMMIN
127049      C
127050      C   IF (TRISE.GT.40.0) CALL QUITER(TRISE,0,98,INFORM)
127051      C
127052      C Compute exhaust temperature for each pollutant.
127053      C
127054      C   DO 30 IP=IP1,IP2
127055      C
127056      C   Select proper equation.
127057      C

```

```
127058      GOTO (10,15,20),IP
127059      C
127060      C Calculate HC exhaust temperature if TEMFLG=1, otherwise
127061      C use the ambient temperature.
127062      C
127063      10 TEMEXH(IP)=AMBT
127064      C
127065      IF (TEMFLG.EQ.1)
127066      *   TEMEXH(IP)=2.2857+0.97674*TEMMIN+0.56881*TRISE
127067      *   +0.0024642*TEMMIN*TRISE
127068      C
127069      GOTO 25
127070      C
127071      C Calculate CO exhaust temperature if TEMFLG=1, otherwise
127072      C use the ambient temperature.
127073      C
127074      15 TEMEXH(IP)=AMBT
127075      C
127076      IF (TEMFLG.EQ.1)
127077      *   TEMEXH(IP)=2.2857+0.97674*TEMMIN+0.56881*TRISE
127078      *   +0.0024642*TEMMIN*TRISE
127079      C
127080      GOTO 25
127081      C
127082      C Calculate NOx exhaust temperature if TEMFLG=1, otherwise
127083      C use the ambient temperature.
127084      C
127085      20 TEMEXH(IP)=AMBT
127086      C
127087      IF (TEMFLG.EQ.1)
127088      *   TEMEXH(IP)=2.2857+0.97674*TEMMIN+0.56881*TRISE
127089      *   +0.0024642*TEMMIN*TRISE
127090      C
127091      C Round the exhaust temperature to the nearest 0.1F.
127092      C
127093      25 TEMEXH(IP)=FLOAT (IFIX (TEMEXH(IP)*10.+5))/10.
127094      C
127095      C Check to see if TEMMIN<=TEMEXH<=TEMMAX.
127096      C
127097      IF (TEMEXH(IP).LT.TEMMIN.OR.TEMEXH(IP).GT.TEMMAX)
127098      *   CALL QUITER (TEMEXH(IP),2,111,INERR)
127099      C
127100      30 CONTINUE
127101      C
127102      C Generate the 3 RVP exhaust cf temperatures. These are the same as the 3
127103      C exhaust TCF temperatures.
127104      C
127105      DO 40 IP=IP1,IP2
127106      TEMAST(IP)=TEMEXH(IP)
127107      40 CONTINUE
127108      C
127109      C Compute evaporative temperature for each evap case.
127110      C
127111      DO 80 IHRD=1,6
127112      C
127113      C Select proper equation.
127114      C
127115      GOTO (45,50,55,60,65,70),IHRD
```

```
127116 C
127117 C Calculate the hot soak temperature if TEMFLG=1 and TEMMAX is
127118 C at or above 40F, otherwise use the ambient temperature.
127119 C
127120 45 TEMVP(IHRD)=AMBT
127121 C
127122 IF(TEMFLG.EQ.1.AND.TEMMAX.GE.40.)
127123 * TEMVP(IHRD)=-1.7474+1.0290*TEMMIN+0.99202*TRISE
127124 * -0.0025173*TEMMIN*TRISE
127125 C
127126 GOTO 75
127127 C
127128 C Calculate running loss temperature if TEMFLG=1 and TEMMAX is
127129 C at or above 40F, otherwise use the ambient temperature.
127130 C
127131 50 TEMVP(IHRD)=AMBT
127132 C
127133 IF(TEMFLG.EQ.1.AND.TEMMAX.GE.40.)
127134 * TEMVP(IHRD)=-1.1977+1.0205*TEMMIN+1.0181*TRISE
127135 * -0.0023797*TEMMIN*TRISE
127136 C
127137 GOTO 75
127138 C
127139 C Calculate 8 AM diurnal tank temperature.
127140 C Tank temperature lags ambient temperature by about 1 hour.
127141 C
127142 55 TEMVP(IHRD)=TEMMIN+0.35*TRISE
127143 C
127144 GOTO 75
127145 C
127146 C Calculate 10-11 AM diurnal tank temperature.
127147 C Tank temperature lags ambient temperature by about 1 hour.
127148 C
127149 60 TEMVP(IHRD)=TEMMIN+0.71*TRISE
127150 C
127151 GOTO 75
127152 C
127153 C Calculate 2 PM diurnal tank temperature.
127154 C Tank temperature lags ambient temperature by about 1 hour.
127155 C
127156 65 TEMVP(IHRD)=TEMMIN+0.94*TRISE
127157 C
127158 GOTO 75
127159 C
127160 C Calculate daily diurnal temperature.
127161 C
127162 70 TEMVP(IHRD)=TRISE
127163 C
127164 GOTO 80
127165 C
127166 C Round the evaporative temperature to the nearest 0.1F.
127167 C
127168 75 TEMVP(IHRD)=FLOAT(IFIX(TEMVP(IHRD)*10.+5))/10.
127169 C
127170 C Check to see if TEMMAX<=TEMVP<=TEMMAX.
127171 C
127172 ITEM=2+IHRD
127173 C
```

Appendix C: MOBILE4 Subroutine CALTEM

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```
127174      IF (TEMEVP(IHRD).LT.TEMMIN.OR.TEMEVP(IHRD).GT.TEMMAX)
127175      *   CALL QUITER(TEMEVP(IHRD),ITEM,111,INERR)
127176      C
127177      80 CONTINUE
127178      C
127179      C   If any evap temperature is 40F or less, or if minimum temp is 25F
127180      C   or less, warn the user that no evap calculations will occur.
127181      C
127182      IF (TEMMAX .LE.40.0 .OR.
127183      *   AMBT .LE.40.0.AND.TEMFLG.EQ.2 .OR.
127184      *   TEMEVP(1).LE.40.0 .OR.
127185      *   TEMEVP(2).LE.40.0 .OR.
127186      *   TEMMIN .LE.25.0) CALL QUITER(0.,0,83,INFORM)
127187      C
127188      RETURN
127189      END
```

```

128000      FUNCTION CALUDI (RVPW,TMIN,TMAX,FILLED)
128001      C
128002      C CALUDI uses passed in fuel RVP levels, minimum and maximum fuel tank
128003      C temperatures and fleet average percent of fuel tank filled to estimate
128004      C an Uncontrolled Diurnal emission rate.
128005      C
128006      C Called by LOCAL
128007      C
128008      C Calls QUITER.
128009      C
128010      C Input on call:
128011      C
128012      C   parameter list:
128013      C   RVPW,TMIN,TMAX,FILLED
128014      C
128015      C   common blocks:
128016      C   /REGION/ IREJN
128017      C
128018      C Output on return:
128019      C
128020      C   function: CALUDI
128021      C
128022      C Local array subscripts :
128023      C
128024      C AIRPRE (2) - AIRPRE ( IREJN )
128025      C FUELT (2) - FUELT ( JV )
128026      C VAPOR (2) - VAPOR ( JV )
128027      C
128028      C Local variable / array dictionary:
128029      C
128030      C Name      Type      Description
128031      C -----
128032      C A          R      coefficient used to calculate VAPOR(1)
128033      C AIRPRE      R      air pressure
128034      C A100        R      coefficient used to calculate A
128035      C C            R      constant, used to calculate A100
128036      C DENSTY      R      fuel density, a function of RVPW
128037      C FILLED      R      percent of fuel tank filled
128038      C FUELT        R      incremental fuel tank temperature in degrees Fahrenheit
128039      C GTP          R      grams of HC loss for temperature pair FUELT
128040      C PI            R      Greek pi = ratio of circumference of a circle to its diameter.
128041      C              Used in computing X.
128042      C RVPW         R      fuel RVPs used to compute the components of the Wade Index
128043      C TMAX        R      maximum temperature
128044      C TMIN        R      minimum temperature
128045      C TP1          R      first coefficient for Wade equation
128046      C TP2          R      second coefficient for Wade equation
128047      C TP3          R      third coefficient for Wade equation
128048      C UDISUM       R      incremental and, eventually, total Uncontrolled Diurnal rate
128049      C VAPOR        R      vapor pressure at FUELT (2 temperatures, 1 degree apart)
128050      C VP100        R      vapor pressure at 100F, a function of RVPW
128051      C VSPACE       R      vapor space in cubic feet, a function of FILLED
128052      C WMOLEC       R      molecular weight, a function of RVPW and fuel temp
128053      C X            R      coefficient used to calculate A100, a function of VP100
128054      C
128055      C Notes:
128056      C
128057      C CALUDI is the sum of HC loss at each fuel temperature increment under the

```


Appendix C: MOBILE4 Function CALUDI

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```

128058 C input conditions.
128059 C
128060 C CALUDI was added for MOBILE4 (code originally from CALIND)
128061 C
128062 C
128063 COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
128064 C
128065 DIMENSION AIRPRE(2),FUELT(2),VAPOR(2)
128066 C
128067 DATA AIRPRE/14.696,12.5/,PI/3.14159/
128068 C
128069 UDISUM=0.0
128070 C
128071 C To calculate the CALUDI value, first compute several parameters and then
128072 C move stepwise through the fuel tank temperature range, adding each
128073 C degree difference pair's contribution to the sum UDI of the grams HC
128074 C loss over the entire range.
128075 C
128076 C Calculate fuel density for given RVPW.
128077 C
128078 DENSTY=6.4-0.01977*RVPW
128079 C
128080 C Calculate vapor space under given percent of fuel tank filled.
128081 C
128082 VSPACE=2.4062-0.02139*FILLED
128083 C
128084 C Calculate vapor pressure at 100 (VP100) for given RVPW.
128085 C
128086 VP100=1.0223*RVPW
128087 * + (0.0357*RVPW)/(1.0-0.0368*RVPW)
128088 C
128089 C Calculate A100 according to VP100.
128090 C
128091 IF (VP100.LT.14.18) GOTO 10
128092 C=80.861
128093 X=0.11*COS((4.0*VP100-9.0)*PI/14.0)
128094 * +5.4*ALOG(VP100)
128095 GOTO 20
128096 C
128097 10 C=66.561
128098 X=0.12*COS((VP100-6.0)*PI/4.0)
128099 * -0.21*SIN(2.0*PI/7.5*(VP100-4.0))
128100 C
128101 20 A100=C-12.822*VP100
128102 * +1.3291*VP100**2
128103 * -0.07991*VP100**3
128104 * +1.9017E-03*VP100**4-X
128105 C
128106 C Initialize fuel tank temperature pair.
128107 C
128108 FUELT(1)=TMIN
128109 FUELT(2)=FUELT(1)+1.0
128110 C
128111 C Iteration starts here.
128112 C
128113 30 CONTINUE
128114 C
128115 C Calculate molecular weight.

```

```

128116 C
128117 WMOLEC=69.69-1.274*RVPW
128118 * +0.059*(FUELT(1)+FUELT(2))/2.0
128119 C
128120 C Calculate vapor pressures.
128121 C
128122 DO 40 JV=1,2
128123 A=A100+(100.0-FUELT(JV))
128124 * *((262.0/(A100/6.0+560.0))-0.01328)
128125 C
128126 C pass JV's A < 0.0 => CALUDI < 0.0 => diurnal evap < 0.0 => fatal error
128127 C Technically, high RVPW (in A100) and high temperature (in FUELT(JV)) does not
128128 C make sense anyway: the gas tank would blow up.
128129 C
128130 IF (A.LT.0.0) CALL QUITER(A,JV,97,INERR)
128131 C
128132 VAPOR(JV)=14.696
128133 * -0.53059*A
128134 * +7.6961E-03*A**2
128135 * -5.4907E-05*A**3
128136 * +1.7044E-07*A**4
128137 40 CONTINUE
128138 C
128139 C Apply Wade equation.
128140 C
128141 TP1=VSPACE*118040.0*DENSITY/(690.0-4.0*WMOLEC)
128142 TP2=VAPOR(1)/(AIRPRE(IREJN)-VAPOR(1))
128143 * +VAPOR(2)/(AIRPRE(IREJN)-VAPOR(2))
128144 TP3=(AIRPRE(IREJN)-VAPOR(1))/(FUELT(1)+460.0)
128145 * - (AIRPRE(IREJN)-VAPOR(2))/(FUELT(2)+460.0)
128146 GTP=TP1*TP2*TP3
128147 C
128148 UDISUM=UDISUM+GTP
128149 C
128150 FUELT(1)=FUELT(1)+1.0
128151 FUELT(2)=FUELT(2)+1.0
128152 IF (FUELT(2).LE.TMAX) GOTO 30
128153 C
128154 CALUDI=UDISUM
128155 C
128156 RETURN
128157 END

```

```

129000      SUBROUTINE GETALH(INERR,*)
129001      C
129002      C GETALH reads in and validates the optional correction factors (BIGALH)
129003      C parameters record.
129004      C
129005      C Called by PARSEC.
129006      C
129007      C Calls QUITER and YRTEST.
129008      C
129009      C Input on call:
129010      C
129011      C     parameter list: INERR
129012      C     common blocks:
129013      C     /FLAGS1/ PROMPT
129014      C     /FLAGS2/ ALHFLG
129015      C     /IOUCOM/ IOUGEN,IOUASK
129016      C     /MAXIMA/ MAXLTW
129017      C
129018      C Output on return:
129019      C
129020      C     parameter list: INERR
129021      C     common blocks:
129022      C     /ALUHIN/ AC,XLOAD,TRAILR,ABSHUM,DB,WB
129023      C
129024      C GETALH was added for MOBILE4.
129025      C
129026      C
129027      C     INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
129028      C     INTEGER ALHFLG
129029      C
129030      C     COMMON /ALUHIN/ AC,XLOAD(3),TRAILR(3),ABSHUM,DB,WB
129031      C     COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
129032      C     COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
129033      C     COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
129034      C     COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
129035      C
129036      C GETALH is called once for each scenario of the run.
129037      C
129038      C Assign db/wb default temperatures for a/c usage (90% for defaults).
129039      C
129040      C     DB=85.
129041      C     WB=75.
129042      C
129043      C Read in BIGCFX parameters only if user flags their presence with ALHFLG.
129044      C ALHFLG also determines the choice of inputs and the corresponding format.
129045      C
129046      C     IF (ALHFLG.EQ.1) GOTO 50
129047      C     IF (ALHFLG.EQ.3) GOTO 20
129048      C
129049      C     IF (PROMPT.EQ.2) WRITE (IOUASK,200)
129050      C     200 FORMAT ('0','Enter AC,XLOAD(3),TRAILR(1),ABSHUM')
129051      C     READ (IOUGEN,100,END=99) AC,XLOAD,TRAILR(1),ABSHUM
129052      C     100 FORMAT (5F4.3,F4.1)
129053      C
129054      C     DO 10 IVP=2,MAXLTW
129055      C     TRAILR(IVP)=TRAILR(1)
129056      C     10 CONTINUE
129057      C     GOTO 30

```

```
129058 C
129059 20 IF (PROMPT.EQ.2) WRITE (10UASK,210)
129060 210 FORMAT ('0','Enter AC,XLOAD(3),TRAILR(3),ABSHUM,DBTEMP,WBTEMP')
129061 READ (10UGEN,110,END=99) AC,XLOAD,TRAILR,ABSHUM,DB,WB
129062 110 FORMAT(7F4.3,3F4.1)
129063 C
129064 C Validate inputs for BIGALH.
129065 C
129066 30 IF (AC.LT.0.0.OR.AC.GT.1.) CALL QUITER (AC,0,44,INERR)
129067 IF (AC.GT.0.0) CALL QUITER (0.,0,56,INERR)
129068 C
129069 DO 40 IVP=1,MAXLTW
129070 IF (XLOAD (IVP) .LT.0.0.OR.XLOAD (IVP) .GT.1.)
129071 * CALL QUITER (XLOAD (IVP) ,0,45,INERR)
129072 IF (TRAILR (IVP) .LT.0.0.OR.TRAILR (IVP) .GT.1.)
129073 * CALL QUITER (TRAILR (IVP) ,0,46,INERR)
129074 40 CONTINUE
129075 C
129076 IF (ABSHUM.LT.20.0.OR.ABSHUM.GT.140.0)
129077 * CALL QUITER (ABSHUM,0,47,INERR)
129078 C
129079 IF (DB.LT.0.0.OR.DB.GT.110.0) CALL QUITER (DB,0,40,INERR)
129080 IF (WB.LT.0.0.OR.WB.GT.110.0) CALL QUITER (WB,0,40,INERR)
129081 IF (WB.GT.DB) CALL QUITER (0.,0,57,INERR)
129082 50 RETURN
129083 C
129084 C EOF on any attempted read => take alternate return 1 => run aborts.
129085 C
129086 99 RETURN1
129087 END
```

Appendix C: MOBILE4 Subroutine REGMOD

May 5, 1989

```

130000      SUBROUTINE REGMOD(ICY,INERR)
130001      C
130002      C   REGMOD adjusts model year mileage/registration arrays.
130003      C
130004      C   Called by MAIN.
130005      C
130006      C   Calls CEVMPD,HDDMYM, IGSFPT and TFCALX.
130007      C
130008      C   Input on call:
130009      C
130010      C       parameter list: ICY,INERR
130011      C       common blocks:
130012      C       /FLAGS2/ MYMRFG
130013      C       /GSFCOM/ GSFRAC
130014      C       /MAXIMA/ MAXVEH,MAXYRS
130015      C       /MYRSAV/ AMAR,JULMYR
130016      C       /REGION/ IREJN
130017      C
130018      C   Output on return:
130019      C
130020      C       parameter list: INERR
130021      C       common blocks:
130022      C       /MYRCAL/ XMYM,JANMYR,TFMYM
130023      C       /REGISF/ GSFVCT
130024      C
130025      C   Local array subscripts:
130026      C
130027      C   CUM(20)  -  CUM ( JDX )
130028      C   DAF(8)   -  DAF ( IV )
130029      C
130030      C   Local variable / array dictionary:
130031      C
130032      C   Name      Type      Description
130033      C   -----
130034      C   CUM        R      cumulative mileage distribution as of January 1
130035      C   DAF        R      unnormalized sum by IV of registrations across my's
130036      C                      (acronym is from ef derivation document)
130037      C   FRC        R      fraction of January 1 registrations in current year JDX
130038      C                      which are in their JDX'th year of operation
130039      C   FRN        R      fraction of January 1 registrations in current year JDX
130040      C                      which are in their JDX-1'th year of operation (1 year newer)
130041      C   GSFIDX     R      gas/diesel sales fraction (GSF) for MY IDX, given IV & IREJN;
130042      C                      used to extract IV's share of pairwise registration sum
130043      C   AMC        R      mileage accrual rate for vehicle of type IV in its JDX'th
130044      C                      year of operation
130045      C   AMN        R      mileage accrual rate for vehicle of type IV in its JDX-1th
130046      C                      year of operation (a vehicle in JDX-1 is 1 year "newer" than
130047      C                      a JDX year old vehicle)
130048      C   MY         I      see parameter dictionary
130049      C   SUMLDV     R      LDV DAF's combined (both gas & diesel registrations)
130050      C   SUMLDT     R      LDT DAF's combined (both gas & diesel registrations)
130051      C
130052      C   Notes:
130053      C
130054      C   none
130055      C
130056      C
130057      C   INTEGER ALHFLG

```


Appendix C: MOBILE4 Subroutine REGMOD

May 5, 1989

```

130058      INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
130059      REAL JULMYR,JANMYR
130060      C
130061      COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
130062      COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
130063      COMMON /GSFCOM/ MAXGSF,GSFRAC(22,8,2),MYGSF(22,8,2)
130064      COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
130065      COMMON /MYRCAL/ XMYM(20,8),JANMYR(20,8),TF(20,8),TFMYM(20,8)
130066      COMMON /MYRSV/ AMAR(20,8),JULMYR(20,8),NEWCUM
130067      COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
130068      COMMON /REGISF/ GSFVCT(8)
130069      C
130070      DIMENSION CUM(20),DAF(8)
130071      REAL AMC,AMN
130072      C
130073      C Compute January 1 registration distributions, JANMYR.
130074      C
130075      DO 20 IV=1,MAXVEH
130076      C
130077      C Step 1: for each model year of each vehicle type, select and apply the
130078      C corresponding GSF to the (gas & diesel combined) July 1
130079      C registrations.
130080      C
130081      DO 10 JDX=1,MAXYRS
130082      MY=ICY-JDX+1
130083      IGS=IGSFPT(MY,IV)
130084      GSFIDX=GSFRAC(IGS,IV,IREJN)
130085      JANMYR(JDX,IV)=GSFIDX*JULMYR(JDX,IV)
130086      10 CONTINUE
130087      C
130088      C Step 2: backup ICY's registrations from 7/1 to 1/1 -
130089      C LDV/T => my starts 10/1 prior yr => 1/1 sales are 1/3 of 7/1 sales.
130090      C HDV & MC => my starts 1/1 => 1/1 sales are 0.
130091      C
130092      JANMYR(1,IV)=JANMYR(1,IV)/3.
130093      IF(IV.EQ.4.OR.IV.GE.7) JANMYR(1,IV)=0.0
130094      20 CONTINUE
130095      C
130096      C Step 3: normalize JANMYR.
130097      C
130098      DO 40 IV=1,MAXVEH
130099      DAF(IV)=0.0
130100      DO 30 JDX=1,MAXYRS
130101      DAF(IV)=DAF(IV)+JANMYR(JDX,IV)
130102      30 CONTINUE
130103      DO 40 JDX=1,MAXYRS
130104      IF(DAF(IV).GT.0.0) JANMYR(JDX,IV)=JANMYR(JDX,IV)/DAF(IV)
130105      40 CONTINUE
130106      C
130107      C Given DAF (JAN 1 unnormalized total (MAXYRS my's combined) registrations),
130108      C calculate the <gas | diesel> / (gas + diesel) fractions for LDV & LDT.
130109      C HDV & MC are assigned unity, since there is no combined gas + diesel
130110      C number in VCOUNT in TFCALX to split by fuel type fraction for these
130111      C vehicle types. An attempt was made to model the HDV gas vs diesel sales,
130112      C but the results proved unsatisfactory.
130113      C
130114      SUMLDV=DAF(1)+DAF(5)
130115      SUMLDT=DAF(2)+DAF(6)

```

Appendix C: MOBILE4 Subroutine REGMOD

May 5, 1989

```

130116 C
130117 GSFVCT(1)=DAF(1)/SUMLDV
130118 GSFVCT(2)=DAF(2)/SUMLDT
130119 GSFVCT(3)=1.
130120 GSFVCT(4)=1.
130121 GSFVCT(5)=DAF(5)/SUMLDV
130122 GSFVCT(6)=DAF(6)/SUMLDT
130123 GSFVCT(7)=1.
130124 GSFVCT(8)=1.
130125 C
130126 C Generate the mileage accrual rates.
130127 C
130128 C If MOBILE4 defaults used, determine the HDDV calendar year mileage
130129 C by registration weighting. Otherwise, use user input mileage.
130130 C
130131 IF (MYMRFG.EQ.1.OR.MYMRFG.EQ.3) CALL HDDMYM(ICY)
130132 C
130133 C Compute the annual mileage / 100,000 distributions, XMYM.
130134 C
130135 DO 60 IV=1,MAXVEH
130136 FRC=.25
130137 IF (IV.EQ.4.OR.IV.EQ.7.OR.IV.EQ.8) FRC=0.0
130138 FRN=1.-FRC
130139 AMN=AMAR(1,IV)
130140 AMC=AMAR(2,IV)
130141 CUM(1)=.5*FRC*AMN
130142 CUM(2)=FRC*(.5*FRC*AMC+AMN)+FRN*((1.+FRC)*.5*AMN)
130143 AMC=AMC+AMN
130144 C
130145 DO 50 JDX=3,MAXYRS
130146 CUM(JDX)=FRC*(.5*FRC*AMAR(JDX,IV)+AMC)+FRN*(.5*(1.+FRC)
130147 * *AMAR(JDX-1,IV)+AMN)
130148 AMN=AMC
130149 AMC=AMC+AMAR(JDX,IV)
130150 50 CONTINUE
130151 C
130152 C Subroutine GETCUM produces the cumulative mileage partial sums array,
130153 C CUMMIL, from XMYM.
130154 C
130155 XMYM(1,IV)=CUM(1)
130156 DO 60 JDX=2,MAXYRS
130157 XMYM(JDX,IV)=CUM(JDX)-CUM(JDX-1)
130158 60 CONTINUE
130159 C
130160 C Now figure the January 1 model year mileage accumulation rates, TFMYM.
130161 C
130162 DO 80 IV=1,MAXVEH
130163 FRC=.25
130164 TFMYM(1,IV)=AMAR(1,IV)
130165 IF (IV.NE.4.AND.IV.NE.7.AND.IV.NE.8) GOTO 70
130166 FRC=0.0
130167 TFMYM(1,IV)=0.0
130168 70 FRN=1.-FRC
130169 C
130170 DO 80 JDX=2,MAXYRS
130171 TFMYM(JDX,IV)=AMAR(JDX-1,IV)*FRN+AMAR(JDX,IV)*FRC
130172 80 CONTINUE
130173 C

```

Appendix C: MOBILE4 Subroutine REGMOD

May 5, 1989

```
130174 C Use TFMYM to generate miles per day by model year group.
130175 C
130176 CALL CEVMPD
130177 C
130178 C Use JANMYR, TFMYM, and GSFVCT to generate the vmt mix and travel fractions.
130179 C
130180 CALL TFCALX(INERR)
130181 C
130182 RETURN
130183 END
```

Appendix C: MOBILE4 Subroutine HDDMYM

May 5, 1989

```

131000      SUBROUTINE HDDMYM(ICY)
131001      C
131002      C   HDDMYM computes annual weighted calendar year mileage for HDDV.
131003      C
131004      C   Called by REGMOD.
131005      C
131006      C   Input on call:
131007      C
131008      C       parameter list: ICY
131009      C       common blocks:
131010      C       /HDDMAR/ LHDVM,MHDVM,HHVDM
131011      C       /HDDREG/ LHDRG,MHDRG,HHDRG
131012      C
131013      C   Output on return:
131014      C
131015      C       common block: /MYRSAV/ AMAR,NEWCUM
131016      C
131017      C   Notes:
131018      C
131019      C   none
131020      C
131021      C
131022      REAL JULMYR
131023      C
131024      COMMON /HDDMAR/ C2BDVM(20),LHDVM(20),MHDVM(20),HHVDM(20)
131025      COMMON /HDDREG/ C2BDRG(21),LHDRG(21),MHDRG(21),HHDRG(21)
131026      COMMON /MYRSAV/ AMAR(20,8),JULMYR(20,8),NEWCUM
131027      C
131028      REAL LHDVM,MHDVM,HHVDM,LHDRG,MHDRG,HHDRG
131029      C
131030      C   Determine pointer KDX. KDX=1 for 1980-, 2 for 1981,
131031      C   3 for 1982, ..., 21 for 2000+.
131032      C
131033      KDX=ICY-1979
131034      IF(KDX.LT.1) KDX=1
131035      IF(KDX.GT.21) KDX=21
131036      C
131037      C   Compute registration weighted annual mileage distribution for HDDV.
131038      C
131039      DO 10 JDX=1,20
131040      AMAR(JDX,7)=(C2BDRG(KDX)*C2BDVM(JDX)+
131041      * LHDRG(KDX)*LHDVM(JDX)+MHDRG(KDX)*MHDVM(JDX)+
131042      * HHDRG(KDX)*HHVDM(JDX))/(C2BDRG(KDX)+LHDRG(KDX)+
131043      * MHDRG(KDX)+HHDRG(KDX))
131044      10 CONTINUE
131045      C
131046      C   Set flag so that model year mileage is recalculated in EFCALX.
131047      C
131048      NEWCUM=1
131049      RETURN
131050      END

```

Appendix C: MOBILE4 Subroutine CEVMPD

May 5, 1989

```

132000      SUBROUTINE CEVMPD
132001      C
132002      C CEVMPD calculates miles per day by the type and relative (to ICY) age of
132003      C the vehicle. The formula uses the REGMOD computed TFMYM (January 1
132004      C mileage accumulation rates). As with TYMYM and BMYTPD, one set
132005      C of rates is calculated for use on all scenarios of the run.
132006      C
132007      C Called by REGMOD.
132008      C
132009      C Input on call:
132010      C
132011      C common blocks:
132012      C /MAXIMA/ MAXVEH,MAXYRS
132013      C /MYRCAL/ TFMYM
132014      C
132015      C Output on return:
132016      C
132017      C common blocks:
132018      C /CEVBMV/ BMYMPD
132019      C
132020      C Notes:
132021      C
132022      C CEVMPD was added for MOBILE4.
132023      C
132024      C
132025      REAL JANMYR
132026      C
132027      COMMON /CEVBMV/ BMYMPD (20,8), BMYTPD (20,8)
132028      COMMON /MAXIMA/ MAXVEH,MAXLTV,MAXPOL,MAXREG,MAXYRS
132029      COMMON /MYRCAL/ XMYM (20,8), JANMYR (20,8), TF (20,8), TFMYM (20,8)
132030      COMMON /TPDCOM/ TPDCO (2,8)
132031      C
132032      DO 10 IV=1,MAXVEH
132033      DO 10 JDX=1,MAXYRS
132034      BMYMPD (JDX,IV) = (TFMYM (JDX,IV) *100000) /365.
132035      10 CONTINUE
132036      C
132037      RETURN
132038      END

```


Appendix C: MOBILE4 Subroutine TFCALX

May 5, 1989

```

133000      SUBROUTINE TFCALX(INERR)
133001      C
133002      C   TFCALX computes the travel fractions, VMT mix, and registration mix.
133003      C
133004      C   Called by REGMOD.
133005      C
133006      C   Calls QUITER.
133007      C
133008      C   Input on call:
133009      C
133010      C       parameter list: INERR
133011      C       common blocks:
133012      C       /FLAGS1/ VMFLAG
133013      C       /MAXIMA/ MAXVEH,MAXYRS
133014      C       /MYRCAL/ JANMYR,TFMYM
133015      C       /REGISF/ GSFVCT
133016      C
133017      C   Output on return:
133018      C
133019      C       parameter list: INERR
133020      C       common blocks:
133021      C       /MYRCAL/ TF
133022      C       /VMXCOM/ REGMIX,TFNORM,VMTMIX
133023      C
133024      C   Local array subscripts:
133025      C
133026      C   VCOUNT(8) - VCOUNT ( IV )
133027      C
133028      C   Local variable / array dictionary:
133029      C
133030      C   Name      Type      Description
133031      C   -----
133032      C   TOTREG    R        total registrations: used to normalize the registration mix
133033      C   TOTVMT    R        total vmt: used to normalize the default vmt mix
133034      C   VCOUNT  R        vehicle count by IV class, scaled by / 10**5; the counts come
133035      C                        from 1986/82 (car/truck) registration data. Note LDGV & LDDV
133036      C                        counts are the identical sum of their registrations and ditto
133037      C                        with LDGT1 & LDDT. Hence, MOBILE4 needs GSFVCT to split the
133038      C                        sums properly. For the other IV, GSFVCT is 1.0 and has no
133039      C                        effects.
133040      C
133041      C   Notes:
133042      C
133043      C   VCOUNT was modified for MOBILE4.
133044      C
133045      C
133046      C       INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
133047      C       REAL JANMYR
133048      C
133049      C       COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
133050      C       COMMON /MAXIMA/ MAXVEH,MAXLW,MAXPOL,MAXREG,MAXYRS
133051      C       COMMON /MYRCAL/ XMYM(20,8), JANMYR(20,8), TF(20,8), TFMYM(20,8)
133052      C       COMMON /REGISF/ GSFVCT(8)
133053      C       COMMON /VMXCOM/ REGMIX(8),TFNORM(8),VMTMIX(8)
133054      C
133055      C       DIMENSION VCOUNT(8)
133056      C
133057      DATA VCOUNT/117.268,18.634,11.518,1.854,117.268,18.634,1.301,

```

4.179/

```

133058      *
133059      C
133060      DO 20 IV=1,MAXVEH
133061      TFNORM(IV)=0.0
133062      C
133063      DO 10 JDX=1,MAXYRS
133064      TFNORM(IV)=TFNORM(IV)+TFMYM(JDX,IV)*JANMYR(JDX,IV)
133065      10 CONTINUE
133066      20 CONTINUE
133067      C
133068      C Calculate normalized VMTMIX only if using default vmt data (VMFLAG = 1).
133069      C
133070      IF (VMFLAG.GT.1) GOTO 50
133071      TOTVMT=0.0
133072      DO 30 IV=1,MAXVEH
133073      VMTMIX(IV)=VCOUNT(IV)*GSFVCT(IV)*TFNORM(IV)
133074      TOTVMT=TOTVMT+VMTMIX(IV)
133075      30 CONTINUE
133076      C
133077      DO 40 IV=1,MAXVEH
133078      VMTMIX(IV)=VMTMIX(IV)/TOTVMT
133079      40 CONTINUE
133080      C
133081      50 DO 70 IV=1,MAXVEH
133082      IF (TFNORM(IV).LE.0.0.AND.VMTMIX(IV).GT.0.0)
133083      * CALL QUITER(0.,IV,48,INERR)
133084      IF (TFNORM(IV).LE.0.0) TFNORM(IV)=1.
133085      C
133086      DO 60 JDX=1,MAXYRS
133087      IDX=21-JDX
133088      TF(IDX,IV)=(TFMYM(JDX,IV)*JANMYR(JDX,IV))/TFNORM(IV)
133089      60 CONTINUE
133090      70 CONTINUE
133091      C
133092      C Calculate normalized REGMIX.
133093      C
133094      TOTREG=0.0
133095      DO 80 IV=1,MAXVEH
133096      REGMIX(IV)=VCOUNT(IV)*GSFVCT(IV)
133097      TOTREG=TOTREG+REGMIX(IV)
133098      80 CONTINUE
133099      C
133100      DO 90 IV=1,MAXVEH
133101      REGMIX(IV)=REGMIX(IV)/TOTREG
133102      90 CONTINUE
133103      C
133104      RETURN
133105      END

```

Appendix C: MOBILE4 Subroutine EFCALX

May 5, 1989

```

201000      SUBROUTINE EFCALX(ICY,INERR)
201001      C
201002      C   EFCALX calculates composite emission factors.
201003      C
201004      C   Called by MAIN.
201005      C
201006      C   Calls BEF, BIGCFX, GETCUM, HCCALX, IEVPTR, IGSFPT, QUITER, REFUEL, RVPEXH,
201007      C       and TAMPER.
201008      C
201009      C   Input on call:
201010      C
201011      C       parameter list: ICY,INERR
201012      C       common blocks:
201013      C       /CITCIN/ CIGAS1,CIGAS2,CIETH1,CIETH2
201014      C       /CITPAR/ FRETH,FRMETH,FRGAS
201015      C       /CITRV3/ RVPX
201016      C       /CUMCOM/ CUMMIL
201017      C       /EGSCAL/ OPENLP
201018      C       /FLAGS3/ RLFLAG
201019      C       /FLAGS4/ PRTFLG,IDLFLG
201020      C       /GSFCOM/ GSFRAC
201021      C       /MAXIMA/ MAXVEH,MAXPOL,MAXYRS
201022      C       /MYRCAL/ TF
201023      C       /MYRSAV/ NEWCUM
201024      C       /REGION/ IREJN
201025      C       /RVPEX2/ OPENCR
201026      C       /VMXCOM/ VMTMIX
201027      C
201028      C   Output on return:
201029      C
201030      C       parameter list: INERR
201031      C       common blocks:
201032      C       /RESUL1/ EFFTP
201033      C       /RESUL3/ VFTP
201034      C
201035      C   Local variable / array dictionary:
201036      C
201037      C   Name      Type      Description
201038      C   -----
201039      C   COMPEF    R         composite emission factor for IDX: summed across IDX to get
201040      C                       EFFTP for the given IP & IV
201041      C   EXHWGT     R         multiplicative weights to be applied to the exh ef returned
201042      C                       by BEF: speed & "BIGALH" cf, travel fraction & RVP cf
201043      C   IBEFSW     I         see parameter dictionary
201044      C   OPENRE     R         open loop technology percentage reduction of HC & CO for a
201045      C   RVOPCF     R         exhaust HC & CO cf for RVP and open loop technology, IV=1,4
201046      C                       given vehicle type and model year
201047      C   VMTAGE     R         see parameter dictionary
201048      C
201049      C   Notes:
201050      C
201051      C   EFCALX was modified for MOBILE4 to modularize idle ef calculations.
201052      C
201053      C
201054      C       CHARACTER*4 SCNAME
201055      C       CHARACTER*1 ASTMCL,AClass
201056      C       INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
201057      C       INTEGER PRTFLG,HCFLAG

```

```

201058 REAL JULMYR,JANMYR
201059 C
201060 COMMON /CITCIN/ UDI (5),IUDI,CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW
201061 COMMON /CITPAR/ SCNAME (4),FRETH,FRMETH,FRGAS
201062 COMMON /CITRV3/ RVPAP (5),RVPX (2,2),ICLASS,ASTMCL,ACLASS (5)
201063 COMMON /CUMCOM/ CUMMIL (20,8)
201064 COMMON /EGSCAL/ AER (11,11,2,2),TGS (11,6,4),EGS (7,2),OPENLP (20,4)
201065 COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
201066 COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
201067 COMMON /GSFCOM/ MAXGSF,GSFRAC (22,8,2),MYGSF (22,8,2)
201068 COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
201069 COMMON /MYRCAL/ XMYM (20,8),JANMYR (20,8),TF (20,8),TFMYM (20,8)
201070 COMMON /MYRSV/ AMAR (20,8),JULMYR (20,8),NEWCOM
201071 COMMON /REGION/ FEET (2),IREJN,ALT,INITPR
201072 COMMON /RESUL1/ EFFTP (3,9),EFEXH (9),EFEVAP (9),EFLOSS (9),EFRUNL (9)
201073 COMMON /RESUL3/ VFTP (3),VEXH,VEVAP,VLOSS,VRUNLS,VIDLE (3)
201074 COMMON /RVPEX2/ MYGRVP (4,4),RVPCF (20,3,4,2),OPENCR
201075 COMMON /SPEED6/ SALHCF (20,3,8)
201076 COMMON /VMXCOM/ REGMIX (8),TFNORM (8),VMTMIX (8)
201077 C
201078 IF (NEWCOM.NE.0) CALL GETCUM
201079 NEWCOM=0
201080 C
201081 C Setup for composite light duty gas truck.
201082 C
201083 VMLDGT=VMTMIX (2)+VMTMIX (3)
201084 IF (VMLDGT.EQ.0.0) VMLDGT=1.
201085 C
201086 C Calculate this scenario's tampering and refueling offsets and RVP correction
201087 C factors.
201088 C
201089 CALL TAMPER (ICY)
201090 IF (PRTFLG.EQ.1.OR.PRTFLG.EQ.4) CALL REFUEL (ICY)
201091 CALL RVPEXH (ICY,1,RVPX (1,1),RVPX (2,1))
201092 IF (FRETH.GT.0.0) CALL RVPEXH (ICY,2,RVPX (1,2),RVPX (2,2))
201093 C
201094 C Call "BIG" correction factor (cf) driver to get cf's for speed, temperature,
201095 C operating mode, tampering, air conditioning, trailer towing, humidity, extra
201096 C load and by-bag RVP, which cf's apply depending on user's input selections.
201097 C
201098 CALL BIGCFX (ICY)
201099 C
201100 C Finally ready for ef calculations - only for user selected pollutants.
201101 C
201102 C First do idle efs (after interpolation zap, move to precede BIGCFX call).
201103 C
201104 IF (IDLFLG.EQ.2) CALL IDLCAL (ICY,VMLDGT,INERR)
201105 C
201106 C Now do FTP efs.
201107 C
201108 IF (PRTFLG.EQ.1.OR.PRTFLG.EQ.4)
201109 * CALL HCCALX (ICY,VMLDGT,INERR)
201110 C
201111 DO 70 IP=2,MAXPOL
201112 IF (PRTFLG.NE.IP.AND.PRTFLG.NE.4) GOTO 70
201113 VFTP (IP)=0.0
201114 EFFTP (IP,9)=0.0
201115 C

```


Appendix C: MOBILE4 Subroutine EFCALX

May 5, 1989

```

201116      DO 60 IV=1,MAXVEH
201117      EFTP(IP,IV)=0.0
201118      IF (VMTMIX(IV).EQ.0.0) GOTO 60
201119      C
201120      DO 50 IDX=1,MAXYRS
201121      C
201122      C If no mileage for this model year / vehicle class case, skip ef calculation.
201123      C Note below IGS retrieval coded for every IDX pass, even though only used
201124      C after exit IDX loop. The TF conditional branch to end of loop is why:
201125      C it causes the last retrieved IGS to be used. There will be at least one,
201126      C since don't get here unless VMTMIX(IV) is positive.
201127      C
201128      IF (TF(IDX,IV).LE.0.0) GOTO 50
201129      C
201130      C Initialize emissions to zero.
201131      C
201132      COMPEF=0.0
201133      C
201134      JDX=21-IDX
201135      VMTAGE=CUMMIL(JDX,IV)/10000.
201136      MY=ICY+IDX-20
201137      IGS=IGSFPT(MY,IV)
201138      C
201139      C Combine speed and aluh correction factor and the travel fraction
201140      C into a single weight to correct the exhaust ef returned from BEF.
201141      C IBEFSW is set to 2 so that BEF performs the operating mode corrections.
201142      C
201143      EXHWGT=SALHCF(IDX,IP,IV)*TF(IDX,IV)
201144      IBEFSW=2
201145      COMPEF=BEF(MY,IDX,ICY,IP,IV,VMTAGE,IBEFSW)*EXHWGT
201146      C
201147      C Motorcycles have no RVP exhaust cf, but get CO open loop technology credit.
201148      C
201149      IF (IV.EQ.8.AND.IP.NE.3)
201150      *      COMPEF=COMPEF*(FRGAS+(FRETH+FRMETH)*(1.0-OPENCR))
201151      C
201152      C Composite ef is complete for diesels and motorcycles.
201153      C
201154      IF (IV.GE.5) GOTO 40
201155      C
201156      C For remaining IV, the RVP CF applied may be 1.0, either because there is no
201157      C correction or because the correction is by bag (& has already been applied
201158      C via OMTCF).
201159      C
201160      C LDGV/T and HDGV NOx have an RVPCF, but no open loop technology credit.
201161      C
201162      IF (IP.EQ.3) COMPEF=COMPEF*RVPCF(IDX,IP,IV,1)
201163      IF (IP.EQ.3) GOTO 40
201164      C
201165      C LDGV/T and HDGV CO get both RVP exhaust and open loop technology cfs
201166      C calculated and applied.
201167      C
201168      OPENRE=1.0-OPENLP(IDX,IV)*OPENCR
201169      RVOPCF=FRGAS*RVPCF(IDX,IP,IV,1)
201170      *      +(FRETH*RVPCF(IDX,IP,IV,2)
201171      *      +FRMETH*RVPCF(IDX,IP,IV,1))*OPENRE
201172      COMPEF=COMPEF*RVOPCF
201173      C

```


Appendix C: MOBILE4 Subroutine EFCALX

May 5, 1989

```
201174      40 EFFTP(IP,IV)=EFFTP(IP,IV)+COMPEF
201175      50 CONTINUE
201176      C
201177      C Sales fractions = 1.0 for all 4 HDV (HDG,HDD x L,H alt) groups and all MC's.
201178      C
201179          IF((IV.NE.4.AND.IV.LT.7).AND.
201180             * (EFFTP(IP,IV).GT.0.0.AND.GSFRAC(IGS,IV,IREJN).EQ.0.0))
201181             * CALL QUITER(0.,IV,67,INERR)
201182             IF(EFFTP(IP,IV).LE.0.0) CALL QUITER(0.,IV,68,INERR)
201183      C
201184          VFTP(IP)=VFTP(IP)+EFFTP(IP,IV)*VMTMIX(IV)
201185      60 CONTINUE
201186      C
201187      C Assign composite light duty gas truck emission factor.
201188      C
201189          IF(EFFTP(IP,2).GT.0.0.AND.EFFTP(IP,3).GT.0.0) EFFTP(IP,9)=
201190             * (EFFTP(IP,2)*VMTMIX(2)+EFFTP(IP,3)*VMTMIX(3))/VMLDGT
201191      70 CONTINUE
201192      C
201193          RETURN
201194          END
```

Appendix C: MOBILE4 Subroutine GETCUM

May 5, 1989

```
202000      SUBROUTINE GETCUM
202001      C
202002      C GETCUM computes average January 1 fleet cumulative mileages.
202003      C
202004      C Called by EFCALX.
202005      C
202006      C Input on call:
202007      C
202008      C   common blocks:
202009      C   /MAXIMA/ MAXVEH,MAXYRS
202010      C   /MYRCAL/ XMYM
202011      C
202012      C Output on return:
202013      C
202014      C   common block: /CUMCOM/ CUMMIL
202015      C
202016      C
202017      REAL JANMYR
202018      C
202019      COMMON /CUMCOM/ CUMMIL(20,8)
202020      COMMON /MAXIMA/ MAXVEH,MAXLW,MAXPOL,MAXREG,MAXYRS
202021      COMMON /MYRCAL/ XMYM(20,8),JANMYR(20,8),TF(20,8),TFMYM(20,8)
202022      C
202023      DO 10 IV=1,MAXVEH
202024      CUMMIL(1,IV)=XMYM(1,IV)*100000.
202025      C
202026      DO 10 JDX=2,MAXYRS
202027      CUMMIL(JDX,IV)=XMYM(JDX,IV)*100000.+CUMMIL(JDX-1,IV)
202028      10 CONTINUE
202029      C
202030      RETURN
202031      END
```

```

203000      SUBROUTINE TAMPER(ICY)
203001      C
203002      C   TAMPER computes tampering effects in grams/mile on bag 1, 2 & 3 HC, CO,
203003      C   & NOX and on hotsoak, diurnal & crankcase HC.
203004      C
203005      C   Called by EFCALX.
203006      C
203007      C   Calls BAGEME, DISATP, EFFGRP, EMIRAT, EVPEME and IMCHEK.
203008      C
203009      C   Input on call:
203010      C
203011      C       parameter list: ICY
203012      C       common blocks:
203013      C       /ATPAR1/ LAPSY,LAPIST,LAPLST,LVTFLG
203014      C       /FLAGS4/ PRTFLG
203015      C       /IMPAR1/ ICYIM
203016      C       /IMPAR3/ IM
203017      C       /MAXIMA/ MAXYRS
203018      C
203019      C   Output on return:
203020      C
203021      C       common blocks:
203022      C       /LOOKUP/ IVTAM
203023      C       /MYCODE/ MY,IDX,JDX,LDXSY,LMYRVT,IMDXSY,IMKINK
203024      C
203025      C   Local variable / array dictionary:
203026      C
203027      C       Name      Type      Description
203028      C       -----
203029      C       LDXIST      I         JDX order pointer to first model year covered by ATP
203030      C       LDXLST      I         JDX order pointer to last model year covered by ATP
203031      C       LMYR        I         flag relating model year to ATP parameters
203032      C                               1 = model year not covered by an ATP
203033      C                               2 = JDX is covered by an ATP (but IVTAM may not be,
203034      C                               hence, check for inclusion to set LMYRVT)
203035      C
203036      C   Notes:
203037      C
203038      C   none
203039      C
203040      C
203041      C       INTEGER PRTFLG,HCFLAG
203042      C
203043      C       COMMON /ATPAR1/ LAPSY,LAPIST,LAPLST,LVTFLG(4)
203044      C       COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
203045      C       COMMON /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER(2),CRIM
203046      C       COMMON /IMPAR3/ IMDX1,IMDX2,IMCASE,IMVEH,IM
203047      C       COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
203048      C       COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
203049      C       COMMON /MYCODE/ MY,IDX,JDX,LDXSY,LMYRVT,IAY,IMDXSY,IMKINK
203050      C
203051      C   Relate start year of anti-tampering program (ATP) and 1st and last model
203052      C   years covered to calendar year. Put them in JDX order. For example:
203053      C
203054      C       ICY = LAPSY => LDXSY = 1
203055      C       ICY = LAPSY + 1 => LDXSY = 2
203056      C       .
203057      C       .

```

Appendix C: MOBILE4 Subroutine TAMPER

May 5, 1989

```

203058 C      ICY = LAPSY + 19 => LDXSY = 20
203059 C
203060 C      JDX order is used because these values are used to access the JDX ordered
203061 C      CUMMIL. Note that LDXSY <= 0 => ICY < LAPSY => no ATP was in effect during
203062 C      any part of the calendar year's 20 model year window.
203063 C
203064 C      The ATP has to be in effect at least 1 year prior to ICY for it to affect
203065 C      ICY's emissions. The mileage accumulated through LAPSY all goes to the no
203066 C      program case.
203067 C
203068 C      Only calculate these values once per scenario => compute them here before
203069 C      the tamper loops begin.
203070 C
203071 C      LDXSY=ICY-LAPSY+1
203072 C      LDXIST=ICY-LAPIST+1
203073 C      LDXLST=ICY-LAPLST+1
203074 C
203075 C      Decide whether to use "Non-1/M" (IM=1) or "1/M" (IM=2) TAMZML and TAMDR:
203076 C
203077 C      CALL IMCHEK(1,ICY,IVTAM,IDX)
203078 C
203079 C      Relate 1/M start year to calendar year, using JDX ordering. This pointer
203080 C      will be used within IDX loop to set kinked tampering rate curves flag.
203081 C
203082 C      IMDXSY=ICY-ICYIM+1
203083 C
203084 C      For each tampering vehicle type and each model year in the 19 year window
203085 C      from ICY-18 thru ICY (20+ year case is always zeroed), compute the bag and
203086 C      evaporative tampering offsets.
203087 C
203088 C      DO 40 IVTAM=1,4
203089 C
203090 C      CALL IMCHEK(2,ICY,IVTAM,IDX)
203091 C
203092 C      DO 30 IDX=2,MAXYRS
203093 C
203094 C      MY pointer info using IDX & ICY may be done here, before sub calls.
203095 C
203096 C      Identify this loop's model year for use in ITAMPT lookups.
203097 C
203098 C      MY=ICY-(20-IDX)
203099 C
203100 C      Assign the reverse order (ICY -> 1, increases with age) my index for use in
203101 C      apportioning mileage weights.
203102 C
203103 C      JDX=21-IDX
203104 C
203105 C      Reset (turn off) the ATP my range switch. Turn on if there is an ATP
203106 C      program, it starts before the calendar year, the model year JDX is in the
203107 C      affected range and the vehicle type has been selected by the user for
203108 C      coverage.
203109 C
203110 C      LMYRVT = 1 => switch is off. ATP not a factor in my JDX's tampering
203111 C      LMYRVT = 2 => switch is ON. ATP is a factor in my JDX's tampering
203112 C
203113 C      Note: ATPFLG = 1 => LAPSY = 2020 => LDXSY < 1 => 1st 2 criteria can be
203114 C      checked using LDXSY.
203115 C

```

Appendix C: MOBILE4 Subroutine TAMPER

May 5, 1989

```
203116      LMYR=1
203117      LMYRVT=1
203118      IF (LDXSY.GT.1.AND.LDX1ST.GE.JDX.AND.JDX.GE.LDXLST)  LMYR=2
203119      IF (LMYR.EQ.2.AND.LVTFLG(IVTAM).EQ.2)  LMYRVT=2
203120      C
203121      CALL IMCHEK(3,ICY,IVTAM,IDX)
203122      C
203123      C Set kinked disablement rate curves flag.
203124      C
203125      IMKINK=1
203126      IF (IM.EQ.2.AND.JDX.GT.IMDXSY) IMKINK=2
203127      C
203128      C Figure the base tampering rates for both exhaust and non-exhaust emissions.
203129      C
203130      CALL DISATP
203131      C
203132      C The next 3 subroutines compute the tampering bag emission additives.
203133      C
203134      CALL EFFGRP
203135      CALL EMIRAT(IDX)
203136      CALL BAGEME
203137      C
203138      C The non-exhaust HC emission additives calculation procedure is much
203139      C simpler because there are no overlaps. EVPEME does all the work.
203140      C
203141      IF (PRTFLG.EQ.1.OR.PRTFLG.EQ.4) CALL EVPEME
203142      C
203143      30 CONTINUE
203144      40 CONTINUE
203145      C
203146      RETURN
203147      END
```


Appendix C: MOBILE4 Subroutine IMCHEK

May 5, 1989

```

204000      SUBROUTINE IMCHEK(ICASE,ICY,IVTAM,IDX)
204001      C
204002      C IMCHEK determines whether or not an I/M program applies to a given IV &
204003      C IDX combination. The calling routine calls (1) before the IVTAM loop starts
204004      C (2) after the IVTAM loop starts but before the IDX loop starts and
204005      C (3) after the IDX loop starts but before the IM flag / subscript is used.
204006      C ICASE is set accordingly. After an ICASE 3 call, IM (index to TAMZML and
204007      C TAMDR) is assigned and a lookup can be done.
204008      C
204009      C Called by REFUEL and TAMPER.
204010      C
204011      C Input on call:
204012      C
204013      C   parameter list: ICASE,ICY,IVTAM,IDX
204014      C   common blocks:
204015      C   /FLAGS2/ IMFLAG
204016      C   /IMPAR1/ ICYIM,MODYR1,MODYR2
204017      C   /IMPAR2/ ILDT
204018      C   /IMPAR3/ IMDX1,IMDX2,IMCASE,IMVEH
204019      C
204020      C Output on return:
204021      C
204022      C   /IMPAR3/ IMDX1,IMDX2,IMCASE,IMVEH,IM
204023      C
204024      C Notes:
204025      C
204026      C IMCHEK was added for MOBILE4.
204027      C
204028      C
204029      C   CHARACTER*4 IMNAME
204030      C   INTEGER ALHFLG
204031      C
204032      C   COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
204033      C   COMMON /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER(2),CRIM
204034      C   COMMON /IMPAR2/ ILDT(4),ITEST,NUDATA(2),NONUDA,NLIM,IMNAME(20,9)
204035      C   COMMON /IMPAR3/ IMDX1,IMDX2,IMCASE,IMVEH,IM
204036      C
204037      C Branch to I/M check case being asked for by ICASE.
204038      C
204039      C   GOTO(10,20,30),ICASE
204040      C
204041      C Case 1: Determine global I/M case and relative start and finish years
204042      C   of the I/M program, if there is one.
204043      C
204044      C An I/M program must exist and its implementation year and first model
204045      C year covered must both precede the evaluation year ICY, for I/M to apply
204046      C to the current scenario.
204047      C
204048      C   10 IF (IMFLAG.EQ.1.OR.ICY.LE.ICYIM.OR.ICY.LE.MODYR1) IMCASE=1
204049      C   IF (IMFLAG.EQ.2.AND.ICY.GT.ICYIM.AND.ICY.GT.MODYR1) IMCASE=2
204050      C
204051      C If I/M applies, relate start and end model years of I/M program to ICY.
204052      C IMDX1 & IMDX2 are in IDX order (2 = my 19 to 20 = my 1 = ICY).
204053      C
204054      C   IF (IMCASE.EQ.1) RETURN
204055      C   IMDX1=MODYR1-ICY+20
204056      C   IMDX2=MODYR2-ICY+20
204057      C   RETURN

```

Appendix C: MOBILE4 Subroutine IMCHEK

May 5, 1989

```
204058 C
204059 C Case 2: Determine if I/M program applies to current IVTAM.
204060 C
204061 C I/M does not apply if it does not apply to the current scenario, determined
204062 C on the Case 1 call to IMCHEK. If I/M applies to the scenario, then the
204063 C user IV coverage selection determines if I/M applies to current IVTAM.
204064 C
204065 C Note: TAMZML and TAMDR do have a set of I/M HDGV cells with values assigned,
204066 C but because MOBILE3 did not recognize I/M for HDGV, MOBILE3 never accessed
204067 C those cells (HDGV -> IMVEH = 1). MOBILE4 has I/M for HDGV, so the values
204068 C are used.
204069 C
204070 C 20 IF (IMCASE.EQ.1) IMVEH=1
204071 C IF (IMCASE.EQ.2) IMVEH=ILDT(IVTAM)
204072 C RETURN
204073 C
204074 C Case 3: determine if I/M program applies to current IDX.
204075 C
204076 C I/M does not apply to IDX, unless it applies to the current IVTAM and IDX
204077 C is within the I/M coverage year range.
204078 C
204079 C 30 IM=1
204080 C IF (IMVEH.EQ.1) RETURN
204081 C IF (IDX.GE.IMDX1.AND.IDX.LE.IMDX2) IM=2
204082 C RETURN
204083 C
204084 C END
```

```

205000      SUBROUTINE DISATP
205001      C
205002      C DISATP computes the disablement rates for the given vehicle type, model
205003      C year and mileage distribution. If the start year of an anti-tampering
205004      C program precedes the calendar year, then 2 sets of rates are produced.
205005      C The first set covers through the ATP start year (the "previous" interval) and
205006      C the second set both "previous" and "subsequent" (to start year) intervals.
205007      C
205008      C Called by TAMPER.
205009      C
205010      C Calls DISIMP.
205011      C
205012      C Input on call:
205013      C
205014      C     common blocks:
205015      C     /IMPAR3/ IM
205016      C     /MYCODE/ JDX,LDXSY,LMYRVT,IMDXSY,IMKINK
205017      C
205018      C Output on return:
205019      C
205020      C     common blocks:
205021      C     /MYCODE/ IAY
205022      C     /TAMEQ2/ BTR
205023      C
205024      C Notes:
205025      C
205026      C DISRAT was modified in MOBILE4 to move rate calculations to DISIMP.
205027      C DISRAT was renamed DISATP in MOBILE4 to show its primary parsing function.
205028      C DISATP was modified for MOBILE4 for the new misfueling algorithm.
205029      C
205030      C
205031      C     COMMON /IMPAR3/ IMDX1,IMDX2,IMCASE,IMVEH,IM
205032      C     COMMON /MYCODE/ MY,IDX,JDX,LDXSY,LMYRVT,IAY,IMDXSY,IMKINK
205033      C     COMMON /TAMEQ2/ BTR(9,2)
205034      C
205035      C Setup section.
205036      C
205037      C     DO 10 IAY=1,2
205038      C     DO 10 ID=1,9
205039      C     BTR(ID,IAY)=0.0
205040      C 10 CONTINUE
205041      C
205042      C Calculate mileage accumulated up through start year of anti-tampering
205043      C program (ATP) and mileage since. Then compute the base tampering rates.
205044      C There are 3 cases:
205045      C
205046      C (1) There is no ATP or the ATP is not in effect until the calendar year
205047      C     or later or the model year (JDX) being checked on this call is not in
205048      C     the range included in the ATP or the VT is not covered by the ATP:
205049      C     Check if ATP-applies switch is on. Off => all mileage is "previous"
205050      C     (to any ATP) => IAY = 1 for all tampering.
205051      C
205052      C     IF (LMYRVT.EQ.1) CALL DISIMP(JDX,1,IM,IMKINK)
205053      C
205054      C (2) There is an ATP and it starts before the model year and JDX is in the
205055      C     ATP affected MY range. All mileage is "subsequent" (to LAPS) =>
205056      C     IAY = 2 for all tampering.
205057      C

```

```

205058      IF (LMYRVT.EQ.2.AND.LDXSY.GT.JDX) CALL DISIMP(JDX,2,IM,IMKINK)
205059      C
205060      C (3) There is an ATP and it starts before ICY but at or after my JDX and
205061      C JDX is in the ATP affected MY range. This case => split mileage into
205062      C "previous" and overall (= total = "previous" + "subsequent") parts.
205063      C "Subsequent" category sizes will be computed in subroutine EFFGRP as
205064      C the difference between the corrected overall and "previous" sizes.
205065      C
205066      IF (LMYRVT.EQ.1.OR.(LMYRVT.EQ.2.AND.LDXSY.GT.JDX)) GOTO 20
205067      C
205068      C Calculate the "previous" segment.
205069      C
205070      LJDY=JDX-LDXSY+1
205071      LKINK=1
205072      IF (IMKINK.EQ.1) LIM=IM
205073      IF (IMKINK.EQ.2.AND.IMDXSY.GT.LDXSY) LKINK=2
205074      IF (IMKINK.EQ.2) LIM=LKINK
205075      CALL DISIMP(LJDY,1,LIM,LKINK)
205076      C
205077      C Calculate the overall segment.
205078      C
205079      CALL DISIMP(JDX,2,IM,IMKINK)
205080      C
205081      C Range checks constraining all cases:
205082      C
205083      C (1) Cannot tamper with < 0% or > 100% of the fleet.
205084      C
205085      20 DO 40 ID=1,9
205086      DO 30 IAY=1,2
205087      IF (BTR(ID,IAY).LT.0.0) BTR(ID,IAY)=0.0
205088      IF (BTR(ID,IAY).GT.1.0) BTR(ID,IAY)=1.0
205089      30 CONTINUE
205090      40 CONTINUE
205091      C
205092      C (2) Note that (1) insures overall misfueling rate (ID=9) is <= 100%.
205093      C Now make the sum of the 2 components of misfueling be = the overall
205094      C misfueling, both insuring the sum is <= 100% and preventing a kink
205095      C up in the slope of the sum's curve, if either the NCKS or TNKS misfueling
205096      C curve has been forced up to zero by (1). The tradeoff in the latter
205097      C case is a kink down in the slope of the fuel inlet (NCKS) or other (TNKS)
205098      C that was not forced up to zero. Finally, the 3 constraint checks'
205099      C conditions are mutually exclusive, so the check order does not matter.
205100      C The 3 checks are the only use of the overall misfueling rates (ID=9).
205101      C The overall misfueling rates are not used hereafter.
205102      C
205103      DO 50 IAY=1,2
205104      IF ((BTR(3,IAY)+BTR(4,IAY)).GT.1.0) BTR(4,IAY)=1.0-BTR(3,IAY)
205105      IF (BTR(3,IAY).GT.BTR(9,IAY)) BTR(3,IAY)=BTR(9,IAY)
205106      IF (BTR(4,IAY).GT.BTR(9,IAY)) BTR(4,IAY)=BTR(9,IAY)
205107      50 CONTINUE
205108      C
205109      C (3) Make sure that Canister Only (ID=6) is <= Canister+Gas Cap (ID=8)
205110      C
205111      IF (BTR(6,1).GT.BTR(8,1)) BTR(6,1)=BTR(8,1)
205112      IF (BTR(6,2).GT.BTR(8,2)) BTR(6,2)=BTR(8,2)
205113      C
205114      RETURN
205115      END

```


Appendix C: MOBILE4 Subroutine DISIMP

May 5, 1989

```

206000      SUBROUTINE DISIMP(LJDX,LAY,LIM,LKINK)
206001      C
206002      C DISIMP takes the passed in ATP case, figures out what I/M case applies,
206003      C calls DISCAL to calculate it and if necessary substitutes Non-I/M / I/M
206004      C line limit values.
206005      C
206006      C Called by DISATP.
206007      C
206008      C Calls AMAX1 (FORTRAN library function) and DISCAL.
206009      C
206010      C Input on call:
206011      C
206012      C     parameter list: LJDX,LAY,LIM,LKINK
206013      C     common blocks:
206014      C     /CUMCOM/ CUMMIL
206015      C     /LOOKUP/ IVTAM
206016      C     /MYCODE/ JDX,IMDXSY
206017      C
206018      C Output on return:
206019      C
206020      C     common blocks:
206021      C     /TAMEQ1/ F50K
206022      C     /TAMEQ2/ BTR
206023      C     /TAMEQ3/ CUMALL,CUMNIM,CUMIM,GT50KA,GT50KN,GT50KI
206024      C
206025      C Local variable / array dictionary:
206026      C
206027      C      Name      Type      Description
206028      C      -----
206029      C DALLIM      R      disablement rate for the all I/M mileage segment case
206030      C DKINKI      R      disablement rate for the kinked I/M mileage segment case
206031      C DNONIM      R      disablement rate for the all non-I/M mileage segment case
206032      C
206033      C Notes:
206034      C
206035      C DISIMP was added for MOBILE4.
206036      C DISIMP was modified for MOBILE4 for the new misfueling algorithm.
206037      C DISIMP was modified for MOBILE4.
206038      C
206039      C
206040      COMMON /CUMCOM/ CUMMIL(20,8)
206041      COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
206042      COMMON /MYCODE/ MY,IDX,JDX,LDXSY,LMYRVT,IAY,IMDXSY,IMKINK
206043      COMMON /TAMEQ1/ TAMZML(9,4,2,2),TAMDR(9,4,3,2),MYGTAM(4),IGT5,F50K
206044      COMMON /TAMEQ2/ BTR(9,2)
206045      COMMON /TAMEQ3/ CUMALL,CUMNIM,CUMIM,GT50KA,GT50KN,GT50KI
206046      C
206047      C Lookup and scale the needed cumulative mileage segments. Based on these
206048      C segments, compute the mileage on each segment greater than 50,000 miles.
206049      C
206050      CUMALL=CUMMIL(LJDX,IVTAM)*.0001
206051      GT50KA=AMAX1(0.0,CUMALL-F50K)
206052      IF(LKINK.EQ.1) GOTO 10
206053      C
206054      CUMNIM=CUMMIL(JDX-IMDXSY+1,IVTAM)*.0001
206055      CUMIM=CUMALL-CUMNIM
206056      GT50KN=AMAX1(0.0,CUMNIM-F50K)
206057      GT50KI=AMAX1(0.0,GT50KA-GT50KN)

```



```
206058 C
206059 10 DO 40 ID=1,9
206060 C
206061 C Case 1: No I/M program applies during the model year interval.
206062 C
206063     DNONIM=DISCAL(1,1,ID)
206064     IF(LIM.EQ.2) GOTO 20
206065     BTR(ID,LAY)=DNONIM
206066     GOTO 40
206067 C
206068 C Case 2: I/M program applies to all years of the model year interval.
206069 C
206070 20 DALLIM=DISCAL(2,1,ID)
206071     IF(LKINK.EQ.2) GOTO 30
206072     BTR(ID,LAY)=DALLIM
206073     IF(DALLIM.GT.DNONIM) BTR(ID,LAY)=DNONIM
206074     GOTO 40
206075 C
206076 C Case 3: I/M program starts to apply during interval -> kink in line's slope.
206077 C
206078 30 DKINKI=DISCAL(LIM,LKINK,ID)
206079     BTR(ID,LAY)=DKINKI
206080     IF(DKINKI.LT.DALLIM) BTR(ID,LAY)=DALLIM
206081     IF(DKINKI.GT.DNONIM) BTR(ID,LAY)=DNONIM
206082 C
206083 40 CONTINUE
206084 C
206085     RETURN
206086     END
```

Appendix C: MOBILE4 Function DISCAL

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```

207000      FUNCTION DISCAL (LIM,LKINK,ID)
207001      C
207002      C DISCAL computes the disablement rate for the given vehicle type, model
207003      C year interval, I/M program (or lack thereof), mileage distribution, and
207004      C disablement class.
207005      C
207006      C Called by DISIMP.
207007      C
207008      C Input on call:
207009      C
207010      C     parameter list: LIM,LKINK,ID
207011      C     common blocks:
207012      C     /LOOKUP/ IVTAM
207013      C     /MYCODE/ MY
207014      C     /TAMEQ1/ TAMZML,TAMDR,MYGTAM
207015      C     /TAMEQ3/ CUMALL,CUMNIM,CUMIM,GT50KA,GT50KN,GT50KI
207016      C
207017      C Output on return:
207018      C
207019      C     function: DISCAL
207020      C
207021      C Local variable / array dictionary:
207022      C
207023      C     Name      Type      Description
207024      C     -----
207025      C     M5IGID      I      switch: 1 = no & 2 = yes to query "belong to myg and
207026      C                               tampering class subject to 50,000 mile DR kink?"
207027      C     M5KINK      I      switch: 1 = no & 2 = yes to query "50,000 kink applies?"
207028      C                               (myg 2 + not misfueling + 50K+ + 50K+ slope steeper)
207029      C
207030      C Notes:
207031      C
207032      C M5KINK logic assumes TAMDR slopes are all positive.
207033      C
207034      C DISCAL was added for MOBILE4.
207035      C DISCAL was modified for MOBILE4.
207036      C DISCAL was modified for MOBILE4, updating common block declarations.
207037      C
207038      C
207039      C     COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
207040      C     COMMON /MYCODE/ MY,IDX,JDX,LDXSY,LMYRVT,IAY,IMDXSY,IMKINK
207041      C     COMMON /TAMEQ1/ TAMZML (9,4,2,2),TAMDR (9,4,3,2),MYGTAM (4),IGT5,F50K
207042      C     COMMON /TAMEQ3/ CUMALL,CUMNIM,CUMIM,GT50KA,GT50KN,GT50KI
207043      C
207044      C The slope for MYG 2 changes at 50,000 miles, except for the 3 misfueling
207045      C categories. The over 50K slopes are stored as MYG 3 in TAMDR.
207046      C
207047      C     IGD=1
207048      C     IF (MY.GT.MYGTAM (IVTAM)) IGD=2
207049      C     M5IGID=1
207050      C     IF (IGD.EQ.2.AND.ID.NE.3.AND.ID.NE.4.AND.ID.NE.9) M5IGID=2
207051      C     M5KINK=1
207052      C     IF (LKINK.EQ.2) GOTO 10
207053      C
207054      C Case 1: a single rate line is used for the entire model year interval:
207055      C     (1) all mileage is on the non-I/M rate line, or
207056      C     (2) all mileage is on the I/M rate line.
207057      C

```

Appendix C: MOBILE4 Function DISCAL

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```

207058      IF (M5IGID.EQ.2.AND.GT50KA.GT.0.0.AND.
207059      *      TAMDR (ID,IVTAM,2,LIM) .LT.TAMDR (ID,IVTAM,3,LIM)) M5KINK=2
207060      DISCAL=TAMZML (ID,IVTAM,IGD,LIM)
207061      C
207062      IF (M5KINK.EQ.1) DISCAL=DISCAL
207063      *      +TAMDR (ID,IVTAM,IGD,LIM)*CUMALL
207064      C
207065      IF (M5KINK.EQ.2) DISCAL=DISCAL
207066      *      +TAMDR (ID,IVTAM,IGD,LIM)*F50K
207067      *      +TAMDR (ID,IVTAM,IGT5,LIM)*GT50KA
207068      C
207069      RETURN
207070      C
207071      C Case 2: An I/M program starts within the interval, covering the model year
207072      C and vehicle class being evaluated. Both the non-I/M and I/M rate
207073      C lines are used - the I/M "kink": non-I/M line intercept, first
207074      C mileage segment times the non-I/M slope & second times the I/M slope.
207075      C The resulting rate may be replaced with other estimates, depending
207076      C on the 2 lines and at what point they are evaluated.
207077      C
207078      10 IF (M5IGID.EQ.2.AND.GT50KI.GT.0.0.AND.
207079      *      TAMDR (ID,IVTAM,2,1) .LT.TAMDR (ID,IVTAM,3,1)) M5KINK=2
207080      DISCAL=TAMZML (ID,IVTAM,IGD,1)
207081      C
207082      IF (M5KINK.EQ.1) DISCAL=DISCAL
207083      *      +TAMDR (ID,IVTAM,IGD,1)*CUMNIM
207084      *      +TAMDR (ID,IVTAM,IGD,2)*CUMIM
207085      C
207086      IF (M5KINK.EQ.2.AND.GT50KN.GT.0.0) DISCAL=DISCAL
207087      *      +TAMDR (ID,IVTAM,IGD,1)*F50K
207088      *      +TAMDR (ID,IVTAM,IGT5,1)*GT50KN
207089      *      +TAMDR (ID,IVTAM,IGT5,2)*CUMIM
207090      C
207091      IF (M5KINK.EQ.2.AND.GT50KN.EQ.0.0) DISCAL=DISCAL
207092      *      +TAMDR (ID,IVTAM,IGD,1)*CUMNIM
207093      *      +TAMDR (ID,IVTAM,IGD,2)*(F50K-CUMNIM)
207094      *      +TAMDR (ID,IVTAM,IGT5,2)*GT50KI
207095      C
207096      RETURN
207097      END

```

```

208000      SUBROUTINE EFFGRP
208001      C
208002      C EFFGRP builds the tampering effects group sizes array. The tampering
208003      C rates from DISATP are modified to account for technology vs tampering
208004      C types, overlap factors, anti-tampering program effectiveness factors and
208005      C technology group sizes. The output rates are divided into effects groups
208006      C corresponding to the significant emission impact tampering groups.
208007      C
208008      C Called by TAMPER.
208009      C
208010      C Calls ADJ12, ATPEFF, A8T011, CIT07, C8T012, ITAMPT, SETEGS and TECHO.
208011      C
208012      C Input on call:
208013      C
208014      C   common blocks:
208015      C   /EGSCAL/ TGS
208016      C   /LOOKUP/ IVTAM
208017      C   /MYCODE/ MY,JDX,LDSY,LMYRV
208018      C   /SIZCAL/ CSIZE
208019      C
208020      C Output on return:
208021      C
208022      C   common blocks:
208023      C   /EGSCAL/ EGS
208024      C   /LOOKUP/ IQG,IPG,JPGD,IGCSF
208025      C   /MYCODE/ IAY
208026      C   /SIZCAL/ TGSUSE,CSAE
208027      C
208028      C Local array subscripts:
208029      C
208030      C CSFIST(7,2,2) - CSFIST ( IC7, IPG, IGCSF )
208031      C
208032      C Local variable / array dictionary:
208033      C
208034      C   Name      Type      Description
208035      C   -----
208036      C CSFIST      R      category size factor for 1st calculation of CSIZE, expressed
208037      C                  as <overlap case's CSF> = <o.c. freq> / <base case freq>,
208038      C                  where <base case> = AorE for IC7=1-3, CATS for IC7=4-7
208039      C
208040      C Notes:
208041      C
208042      C EFFGRP was modified for MOBILE4 to add the IGCSF dimension to CSFIST.
208043      C
208044      C
208045      C   DIMENSION CSFIST(7,2,2)
208046      C
208047      C   COMMON /EGSCAL/ AER(11,11,2,2),TGS(11,6,4),EGS(7,2),OPENLP(20,4)
208048      C   COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
208049      C   COMMON /MYCODE/ MY,IDX,JDX,LDSY,LMYRV,IAY,IMDSY,IMKINK
208050      C   COMMON /SIZCAL/ ATR(5,2),TGSUSE,CSIZE(12,2),CSAE(12)
208051      C
208052      C   DATA CSFIST/.2025,.1942,.0423,.3454,.0270,.2371,.1176,
208053      C   1      .0608,.1466,.0367,.2516,.0283,.3750,.0802,
208054      C   2      .1349,.0353,.0161,.1392,.0263,.1899,.0526,
208055      C   2      .0786,.0137,.0149,.0778,.0000,.2780,.0750/
208056      C
208057      C Zero out tampering effects group sizes (EGS) array.

```

Appendix C: MOBILE4 Subroutine EFFGRP

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```

208058 C
208059      DO 20 IPG=1,2
208060      DO 10 IEG=1,7
208061      EGS(IEG,IPG)=0.0
208062      10 CONTINUE
208063      20 CONTINUE
208064 C
208065 C Add in each equipment (technology) group's before and after anti-tampering
208066 C program (ATP) start year contribution to each EGS category for each
208067 C pollutant group.
208068 C
208069      DO 80 IPG=1,2
208070 C
208071 C Set ATR pointer for 1st 3 sizes: HC/CO => use AIRS, NOX => use EGRS.
208072 C
208073      IF (IPG.EQ.1) JPGD=1
208074      IF (IPG.EQ.2) JPGD=5
208075 C
208076      DO 70 IQG=1,6
208077 C
208078 C Lookup technology group size to be used on this pass.
208079 C
208080      IG1=ITAMPT(1)
208081      TGSUSE=TGS(IG1,IQG,IVTAM)
208082 C
208083 C Check how technology type & size affect tampering rates.
208084 C
208085      CALL TECHO(*70)
208086 C
208087 C HC & CO effects category sizes are identical => only 2 pollutant passes.
208088 C
208089      DO 65 IAY=1,2
208090 C
208091 C Skip to end of loop if no mileage accumulated (hence no tampering)
208092 C for the pre/post ATP year case being checked.
208093 C
208094      IF (IAY.EQ.1.AND.LMYRVT.EQ.2.AND.LDXSY.GT.JDX) GOTO 65
208095      IF (IAY.EQ.2.AND.LMYRVT.EQ.1) GOTO 65
208096 C
208097      IF (MY.LE.1980) IGCSF=1
208098      IF (MY.GE.1981) IGCSF=2
208099 C
208100      CALL C1T07(CSF1ST(1,IPG,IGCSF))
208101      CALL C8T012
208102 C
208103 C The first calculation pass can produce negative sizes for the no
208104 C overlap (8-11) and the no effects (12) categories. Correct these
208105 C by calling A8T011 and ADJ12, respectively.
208106 C
208107      DO 30 IC=8,11
208108      IF (CSIZE(IC,IAY).LT.0) CALL A8T011(IC)
208109      30 CONTINUE
208110      IF (CSIZE(12,IAY).LT.0) CALL ADJ12(CSF1ST)
208111 C
208112 C "Subsequent" (to ATP start year) pass + have split mileage case =>
208113 C "subsequent" category size = overall size - "previous" size
208114 C
208115 C I.e., in the split mileage case, the program computes the previous to

```


Appendix C: MOBILE4 Subroutine EFFGRP

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```
208116 C ATP start year and overall values up to this point. After this next
208117 C loop assigns the subsequent values as residuals, the program works
208118 C directly with the previous and subsequent cases in the calls to ATPEFF
208119 C and SETEGS.
208120 C
208121 C IF (IAY.EQ.1.OR.LMYRVT.EQ.1.OR.LDXSY.GT.JDX) GOTO 50
208122 C DO 40 IC=1,12
208123 C CSIZE(IC,2)=CSIZE(IC,2)-CSIZE(IC,1)
208124 C 40 CONTINUE
208125 C
208126 C Check if ATP covers this MY. Yes => apply effectiveness factors to the
208127 C category sizes.
208128 C
208129 C 50 IF (LMYRVT.EQ.2) CALL ATPEFF(*60)
208130 C
208131 C Otherwise just shift IAY's sizes to CSAE without modification.
208132 C
208133 C DO 55 IC=1,12
208134 C CSAE(IC)=CSIZE(IC,IAY)
208135 C 55 CONTINUE
208136 C
208137 C Set the effects group sizes.
208138 C
208139 C 60 CALL SETEGS
208140 C
208141 C 65 CONTINUE
208142 C 70 CONTINUE
208143 C 80 CONTINUE
208144 C
208145 C RETURN
208146 C END
```

Appendix C: MOBILE4 Subroutine EMIRAT

May 5, 1989

```

209000      SUBROUTINE EMIRAT(IDX)
209001      C
209002      C  EMIRAT computes / assigns emission impact rates for the tampering effects
209003      C  groups.
209004      C
209005      C  Called by TAMPER.
209006      C
209007      C  Calls ITAMPT, OUTPOL.
209008      C
209009      C  Input on call:
209010      C
209011      C      parameter list: IDX
209012      C      common blocks:
209013      C      /EGSCAL/ TGS
209014      C      /EMECAL/ EM3W,EMOX,EMEGR
209015      C      /FLAGS4/ IDLFLG
209016      C      /LOOKUP/ IVTAM
209017      C      /MAXIMA/ MAXPOL
209018      C      /TAMID1/ EM13W,EMIOX
209019      C
209020      C  Output on return:
209021      C
209022      C      common blocks:
209023      C      /EGSCAL/ OPENLP
209024      C      /EMECAL/ EMI
209025      C      /LOOKUP/ IQG
209026      C      /TAMID1/ EMIDL
209027      C
209028      C  Local variable dictionary:
209029      C
209030      C      Name      Type      Description
209031      C      -----
209032      C      POX        R      percentage of vehicles equipped with oxidation catalysts
209033      C      POXN        R      POX normalized to ox cat equipped / all cat equipped
209034      C      P3W         R      percentage of vehicles equipped with 3-way catalysts
209035      C      P3WN        R      P3W normalized to 3-way cat equipped / all cat equipped
209036      C      TK         R      percentage of fleet equipped with catalysts
209037      C
209038      C  Notes:
209039      C
209040      C  EMIRAT was modified for MOBILE4.
209041      C
209042      C
209043      C      INTEGER PRTFLG,HCFLAG
209044      C
209045      C      COMMON /EGSCAL/ AER(11,11,2,2),TGS(11,6,4),EGS(7,2),OPENLP(20,4)
209046      C      COMMON /EMECAL/ EM3W(3,3,3),EMOX(3,3,3),EMEGR(4,3,3),EMI(7,3,3)
209047      C      COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
209048      C      COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
209049      C      COMMON /TAMID1/ EM13W(3,3,3),EMIOX(3,3,3),EMIDL(3,4,3)
209050      C      COMMON /TAMID2/ MYIDLE(3,3),IEK
209051      C      COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
209052      C
209053      C  Compute the percentage of vehicles equipped with 3-way and oxidation
209054      C  catalysts.
209055      C
209056      C      P3W=0.0
209057      C      DO 10 IQG=5,6

```

Appendix C: MOBILE4 Subroutine EMIRAT

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```

209058      IG1=ITAMPT(1)
209059      P3W=P3W+TGS(IG1,IQG,IVTAM)
209060      10 CONTINUE
209061      C
209062      POX=0.0
209063      DO 20 IQG=2,3
209064      IG1=ITAMPT(1)
209065      POX=POX+TGS(IG1,IQG,IVTAM)
209066      20 CONTINUE
209067      POX=POX-P3W
209068      C
209069      C Normalize the percentages in order to use them as weights.
209070      C
209071      TK=P3W+POX
209072      C
209073      C Avoid divide by zero runtime error.
209074      C
209075      IF (TK.EQ.0.0) TK=1.0
209076      P3WN=P3W/TK
209077      POXN=POX/TK
209078      C
209079      C Estimate open loop percentage as the complement of the 3-way catalyst
209080      C percentage. Note that in TAMPER, the IDX = 1 = 20+ MY cell case is skipped.
209081      C One result is that OPENLP for this case remains zero and hence in EFCALX
209082      C zeroes out the corresponding open loop exhaust HC credit.
209083      C
209084      OPENLP(IDX,IVTAM)=1.0-P3W
209085      C
209086      C Determine pollutants
209087      C
209088      CALL OUTPOL(IP1,IP2)
209089      C
209090      C Compute / assign emissions impact for each bag for each pollutant.
209091      C
209092      DO 50 IP=IP1,IP2
209093      DO 40 IB=1,3
209094      C
209095      C Air pump disablement (air pump only equipped) emission impact is the
209096      C oxidation catalyst emission for the given bag and pollutant. These
209097      C numbers are constant with respect to model year and vehicle type and
209098      C therefore are hardcoded in BLOCK DATA into EMI(1,IB,IP). Note that
209099      C EMI(1,IB,IP) = EMOX(1,IB,IP) for all IB,IP. If EMI for air pump
209100      C disablement becomes variable in MOBILE4+, the code will be inserted here.
209101      C
209102      C Next 3 effects groups use the catalyst type weighted emissions.
209103      C
209104      DO 30 IEG=2,4
209105      IEK=IEG-1
209106      EMI(IEG,IB,IP)=P3WN*EM3W(IEK,IB,IP)+POXN*EMOX(IEK,IB,IP)
209107      30 CONTINUE
209108      C
209109      C Get EGR only MY group pointer and look up corresponding emission impact.
209110      C
209111      IG2=ITAMPT(2)
209112      EMI(5,IB,IP)=EMEGR(IG2,IB,IP)
209113      C
209114      C EGR disabled / catalyst removed and EGR disabled / misfueled emissions are
209115      C a constant function of bag and pollutant. As with group 1, the values are

```

```

209058      IG1=ITAMPT(1)
209059      P3W=P3W+TGS(IG1,IQG,IVTAM)
209060      10 CONTINUE
209061      C
209062      POX=0.0
209063      DO 20 IQG=2,3
209064      IG1=ITAMPT(1)
209065      POX=POX+TGS(IG1,IQG,IVTAM)
209066      20 CONTINUE
209067      POX=POX-P3W
209068      C
209069      C Normalize the percentages in order to use them as weights.
209070      C
209071      TK=P3W+POX
209072      C
209073      C Avoid divide by zero runtime error.
209074      C
209075      IF (TK.EQ.0.0) TK=1.0
209076      P3WN=P3W/TK
209077      POXN=POX/TK
209078      C
209079      C Estimate open loop percentage as the complement of the 3-way catalyst
209080      C percentage. Note that in TAMPER, the IDX = 1 = 20+ MY cell case is skipped.
209081      C One result is that OPENLP for this case remains zero and hence in EFCALX
209082      C zeroes out the corresponding open loop exhaust HC credit.
209083      C
209084      OPENLP(IDX,IVTAM)=1.0-P3W
209085      C
209086      C Determine pollutants
209087      C
209088      CALL OUTPOL(IP1,IP2)
209089      C
209090      C Compute / assign emissions impact for each bag for each pollutant.
209091      C
209092      DO 50 IP=IP1,IP2
209093      DO 40 IB=1,3
209094      C
209095      C Air pump disablement (air pump only equipped) emission impact is the
209096      C oxidation catalyst emission for the given bag and pollutant. These
209097      C numbers are constant with respect to model year and vehicle type and
209098      C therefore are hardcoded in BLOCK DATA into EMI(1,IB,IP). Note that
209099      C EMI(1,IB,IP) = EMOX(1,IB,IP) for all IB,IP. If EMI for air pump
209100      C disablement becomes variable in MOBILE4+, the code will be inserted here.
209101      C
209102      C Next 3 effects groups use the catalyst type weighted emissions.
209103      C
209104      DO 30 IEG=2,4
209105      IEK=IEG-1
209106      EMI(IEG,IB,IP)=P3WN*EM3W(IEK,IB,IP)+POXN*EMOX(IEK,IB,IP)
209107      30 CONTINUE
209108      C
209109      C Get EGR only MY group pointer and look up corresponding emission impact.
209110      C
209111      IG2=ITAMPT(2)
209112      EMI(5,IB,IP)=EMEGR(IG2,IB,IP)
209113      C
209114      C EGR disabled / catalyst removed and EGR disabled / misfueled emissions are
209115      C a constant function of bag and pollutant. As with group 1, the values are

```

Appendix C: MOBILE4 Subroutine EMIRAT

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```
209116 C hardcoded in BLOCK DATA into EMI(6,IB,IP) and EMI(7,IB,IP), respectively.
209117 C Future versions of the model may vary these emissions on some other
209118 C parameter(s) such as model year and vehicle type, in which case the
209119 C computation / assignment of values would go here.
209120 C
209121 C 40 CONTINUE
209122 C 50 CONTINUE
209123 C
209124 C If idle ef requested do emission impact rates for idle tampering effects.
209125 C
209126 C IF(IDLFLG.EQ.1) GOTO 80
209127 C DO 70 IP=1,MAXPOL
209128 C DO 60 IEG=2,4
209129 C IEK=IEG-1
209130 C
209131 C Get model year group pointer for idle tampering rates
209132 C
209133 C IGTIDL=ITAMPT(5)
209134 C EMIDL(IGTIDL,IEG,IP)=P3WN*EMI3W(IGTIDL,IEK,IP)+
209135 C * POXN*EMIOX(IGTIDL,IEK,IP)
209136 C IF(IEG.EQ.2) EMIDL(IGTIDL,1,IP)=EMIDL(IGTIDL,IEG,IP)
209137 C 60 CONTINUE
209138 C 70 CONTINUE
209139 C
209140 C 80 RETURN
209141 C END
```


Appendix C: MOBILE4 Subroutine BAGEME

May 5, 1989

```

210000      SUBROUTINE BAGEME
210001      C
210002      C BAGEME multiplies the effects group sizes times the corresponding
210003      C weighted emission impact rates to get the tampering bag emission effects
210004      C and idle tampering offsets.
210005      C
210006      C Called by TAMPER.
210007      C
210008      C Input on call:
210009      C
210010      C   common blocks:
210011      C   /EGSCAL/ EGS
210012      C   /EMECAL/ EMI
210013      C   /FLAGS4/ IDLFLG
210014      C   /LOOKUP/ IVTAM
210015      C   /MAXIMA/ MAXPOL
210016      C   /MYCODE/ IDX
210017      C   /TAMID1/ EMIDL
210018      C
210019      C Output on return:
210020      C
210021      C   common blocks:
210022      C   /LOOKUP/ IPG
210023      C   /TAMID2/ IEK
210024      C   /TAMID3/ OFFIDL
210025      C   /TAMOUT/ TAMBAG
210026      C
210027      C Local variable dictionary:
210028      C
210029      C   Name      Type      Description
210030      C   -----
210031      C   EMSUM      R      tampering emission effects sum for given IVTAM, IDX, IP & IB
210032      C   EISUM      R      idle tampering emission effects sum for given IDX & IP
210033      C   Notes:
210034      C
210035      C BAGEME was modified for MOBILE4.
210036      C
210037      C
210038      C   INTEGER PRTFLG,HCFLAG
210039      C
210040      C   COMMON /EGSCAL/ AER(11,11,2,2),TGS(11,6,4),EGS(7,2),OPENLP(20,4)
210041      C   COMMON /EMECAL/ EM3W(3,3,3),EMOX(3,3,3),EMEGR(4,3,3),EMI(7,3,3)
210042      C   COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
210043      C   COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
210044      C   COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
210045      C   COMMON /MYCODE/ MY,IDX,JDX,LDXSY,LMYRVT,IAY,IMDXSY,IMKINK
210046      C   COMMON /TAMID1/ EM13W(3,3,3),EMIOX(3,3,3),EMIDL(3,4,3)
210047      C   COMMON /TAMID2/ MYIDLE(3,3),IEK
210048      C   COMMON /TAMID3/ OFFIDL(3,20,4)
210049      C   COMMON /TAMOUT/ TAMBAG(3,3,20,4),THS(2,20,4),TDU(20,4),TCC(20,4)
210050      C
210051      C   DO 40 IP=1,MAXPOL
210052      C
210053      C Effects group sizes are identical for HC and CO, but the emissions
210054      C impacts are not.
210055      C
210056      C   IPG=1
210057      C   IF(IP.EQ.3) IPG=2

```

```
210058      C
210059      DO 20 IB=1,3
210060      EMSUM=0.0
210061      C
210062      DO 10 IEG=1,7
210063      EMSUM=EMSUM+EGS (IEG,IPG)*EMI (IEG,IB,IP)
210064      10 CONTINUE
210065      C
210066      TAMBAG (IB,IP,IDX,IVTAM)=EMSUM
210067      20 CONTINUE
210068      C
210069      C If idle ef requested, do idle tampering offset for current IP & IDX case.
210070      C
210071      IF (IDLFLG.EQ.1) GOTO 40
210072      EISUM=0.0
210073      C
210074      DO 30 IEG=1,4
210075      IEK=IEG-1
210076      IF (IEG.EQ.1) IEK=1
210077      IGTIDL=ITAMPT (5)
210078      EISUM=EISUM+EGS (IEG,IPG)*EMIDL (IGTIDL,IEG,IP)
210079      30 CONTINUE
210080      C
210081      OFFIDL (IP,IDX,IVTAM)=EISUM
210082      40 CONTINUE
210083      C
210084      RETURN
210085      END
```

Appendix C: MOBILE4 Subroutine EVPEME

May 5, 1989

```

211000      SUBROUTINE EVPEME
211001      C
211002      C EVPEME serves the same functions for evaporative (evap = hot soak + diurnal)
211003      C and crankcase (cc) HC as EFFGRP, EMIRAT and BAGEME do for exhaust IP,
211004      C producing hs & du HC tampering rates & cc HC offset. The task is simplified
211005      C into one subroutine because there is no overlap categorization or
211006      C weighting. The appropriate numbers are looked up and multiplied
211007      C together with only anti-tampering effectiveness reductions (if any) applied.
211008      C
211009      C Called by TAMPER.
211010      C
211011      C Calls ITAMPT,OTCALC.
211012      C
211013      C Input on call:
211014      C
211015      C   common blocks:
211016      C   /EVPDAT/ EVPAER,EVPTGS,CCEMI
211017      C   /LOOKUP/ IVTAM
211018      C   /MYCODE/ IDX,JDX,LDXSY,LMYRVT
211019      C   /TAMEQ2/ BTR
211020      C
211021      C Output on return:
211022      C
211023      C   common blocks:
211024      C   /LOOKUP/ IHG
211025      C   /TAMOUT/ THS,TDU,TCC
211026      C   /TAMOU2/ TOB,GCONLY
211027      C
211028      C Local variable dictionary:
211029      C
211030      C   Name      Type      Description
211031      C   -----
211032      C   OTR        R        overall (previous + subsequent my ranges) tampering rate
211033      C   OTRCAR     R        carbureted hot soak affecting overall tampering rate
211034      C   OTRINJ     R        fuel injected hot soak affecting overall tampering rate
211035      C   PCTEQP     R        percentage of IVTAM fleet equipped with IHG technology,
211036      C                       given IG3
211037      C
211038      C Notes:
211039      C
211040      C EVPEME was modified for MOBILE4 for AER/EVPAER internal generation.
211041      C EVPEME was modified for MOBILE4, updating common block declarations.
211042      C
211043      C
211044      C   COMMON /EVPDAT/ EVPAER(3,2),EVPTGS(3,2,4),CCEMI(7,4)
211045      C   COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
211046      C   COMMON /MYCODE/ MY,IDX,JDX,LDXSY,LMYRVT,IAY,IMDXSY,IMKINK
211047      C   COMMON /TAMEQ2/ BTR(9,2)
211048      C   COMMON /TAMOUT/ TAMBAG(3,3,20,4),THS(2,20,4),TDU(20,4),TCC(20,4)
211049      C   COMMON /TAMOU2/ TOB(20,4),GCONLY(20,4)
211050      C
211051      C For MOBILE4, crankcase (IH = 3) processing does not change.
211052      C Diurnal processing only changes in its selection of the new evaporative
211053      C cannister + gas cap tampering (ID = 8) instead of the previously used
211054      C evaporative cannister only (ID = 6). Since aside from data point selection,
211055      C the procedures for calculating the diurnal and crankcase offsets are the
211056      C same, a loop structure remains the convenient way to program the procedure
211057      C Hot soak, on the other hand, has become more complicated and has therefore

```

```

211058 C been pulled from the old IH loop and treated separately, after the diurnal
211059 C and crankcase offsets have been computed.
211060 C
211061 C MOBILE4 defers HS and DU tampering offset calculation to CCEVRT,
211062 C returning only the % equipped * overall tampering rates instead.
211063 C
211064 C DO 10 IH=2,3
211065 C
211066 C There are only two evaporative cases, not three, when indexing the
211067 C anti-tampering effectiveness rates, evaporative technology group sizes,
211068 C and the model year groups for the group sizes and the evaporative emission
211069 C impact rates: for these arrays, the hot soak and diurnal numbers are
211070 C identical. For convenience we use IHG instead of IH in these arrays.
211071 C
211072 C IHG=IH-1
211073 C
211074 C Assign the tampering index (see paragraph preceding DO statement).
211075 C
211076 C ID=9-IHG
211077 C
211078 C Get the overall tampering rate. As in DISATP, there are 3 cases:
211079 C
211080 C (1) No ATP or its start year is after ICY or IDX is not in affected my
211081 C range: use the "previous" base rate without applying the
211082 C effectiveness rates.
211083 C
211084 C IF (LMYRVT.EQ.1) OTR=BTR(ID,1)
211085 C
211086 C (2) There is an ATP and its start year is before IDX and IDX is in the
211087 C affected my range: use the "subsequent" rate * the effectiveness
211088 C rate.
211089 C
211090 C IF (LMYRVT.EQ.2.AND.LDXSY.GT.JDX.AND.ID.EQ.7)
211091 C * OTR=OTCALC(ID,2,IHG,2)
211092 C IF (LMYRVT.EQ.2.AND.LDXSY.GT.JDX.AND.ID.EQ.8)
211093 C * OTR=OTCALC(ID-2,2,IHG,2)+OTCALC(ID,2,3,2)-OTCALC(ID-2,2,3,2)
211094 C
211095 C (3) There is an ATP and its start year is at or after IDX but before ICY
211096 C and IDX is in the affected my range: sum the rates * their
211097 C corresponding effectiveness rates. Note that in this case, BTR holds
211098 C the "previous" and overall rates => subtract 1st from 2nd to get the
211099 C "subsequent" rates.
211100 C
211101 C IF (LMYRVT.EQ.2.AND.LDXSY.LE.JDX.AND.ID.EQ.7)
211102 C * OTR=OTCALC(ID,1,IHG,1)+OTCALC(ID,2,IHG,2)-OTCALC(ID,1,IHG,2)
211103 C IF (LMYRVT.EQ.2.AND.LDXSY.LE.JDX.AND.ID.EQ.8)
211104 C * OTR=OTCALC(ID-2,1,IHG,1)+OTCALC(ID,1,3,1)-OTCALC(ID-2,1,3,1)
211105 C * +OTCALC(ID-2,2,IHG,2)+OTCALC(ID,2,3,2)-OTCALC(ID-2,2,3,2)
211106 C * - (OTCALC(ID-2,1,IHG,2)+OTCALC(ID,1,3,2)-OTCALC(ID-2,1,3,2))
211107 C
211108 C Lookup model year group pointers.
211109 C
211110 C IG3=ITAMPT(3)
211111 C
211112 C IF (IH.EQ.3) IG4=ITAMPT(4)
211113 C
211114 C Lookup and apply the percentage equipped and emission impact factors.
211115 C

```


Appendix C: MOBILE4 Subroutine EVPEME

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```

211116      PCTEQP=EVPTGS (IG3,IHG,IVTAM)
211117      IF (IH.EQ.2) TDU(IDX,IVTAM)=OTR*PCTEQP
211118      IF (IH.EQ.3) TCC(IDX,IVTAM)=OTR*PCTEQP*CCEMI (IG4,IVTAM)
211119      10 CONTINUE
211120      C
211121      C Now calculate the hot soak offset. This case is complicated by both the
211122      C usage of 2 tampering types (evaporative cannister only and evaporative
211123      C cannister plus gas caps) and the weighting together of fuel injected and
211124      C carbureted emission impact rates.
211125      C
211126      IH=1
211127      IHG=IH
211128      C
211129      C Assign the carbureted tampering index = evaporative cannister only, since
211130      C carbureted hot soak HC is not affected by gas cap tampering. The fuel
211131      C injected index is ID+2 = 8 = cannister + gas caps.
211132      C
211133      ID=6
211134      C
211135      C Get the overall tampering rates. As with diurnal and crankcase, there are
211136      C 3 cases, but now 2 rates are computed.
211137      C
211138      C (1) No ATP or its start year is after ICY or IDX is not in affected my
211139      C range: use the "previous" base rate without applying the
211140      C effectiveness rates.
211141      C
211142      IF (LMYRVT.NE.1) GOTO 20
211143      OTRCAR=BTR (ID,1)
211144      OTRINJ=BTR (ID+2,1)
211145      GOTO 40
211146      C
211147      C (2) There is an ATP and its start year is before IDX and IDX is in the
211148      C affected my range: use the "subsequent" rate * the effectiveness
211149      C rate.
211150      C
211151      20 IF (LDXSY.LE.JDX) GOTO 30
211152      OTRCAR=OTCALC (ID,2,IHG,2)
211153      OTRINJ=OTCALC (ID,2,IHG,2)+OTCALC (ID+2,2,3,2)-OTCALC (ID,2,3,2)
211154      GOTO 40
211155      C
211156      C (3) There is an ATP and its start year is at or after IDX but before ICY
211157      C and IDX is in the affected my range: sum the rates * their
211158      C corresponding effectiveness rates. Note that in this case, BTR holds
211159      C the "previous" and overall rates => subtract 1st from 2nd to get the
211160      C "subsequent" rates.
211161      C
211162      30 OTRCAR=OTCALC (ID,1,IHG,1)+OTCALC (ID,2,IHG,2)-OTCALC (ID,1,IHG,2)
211163      OTRINJ=OTCALC (ID,1,IHG,1)+OTCALC (ID+2,1,3,1)-OTCALC (ID,1,3,1)
211164      * +OTCALC (ID,2,IHG,2)+OTCALC (ID+2,2,3,2)-OTCALC (ID,2,3,2)
211165      * - (OTCALC (ID,1,IHG,2)+OTCALC (ID+2,1,3,2)-OTCALC (ID,1,3,2))
211166      C
211167      C Save the unweighted (by PCTEQP) Evaporative Cannister (EC) Only tampering
211168      C rate for figuring the On Board (OB) EC tampering impact on refueling losses.
211169      C Lookup model year group pointer for the percentage equipped table.
211170      C
211171      40 TOB (IDX,IVTAM)=OTRCAR
211172      IG3=ITAMPT (3)
211173      C

```


Appendix C: MOBILE4 Subroutine EVPEME

May 5, 1989

```
211174 C Lookup the percentage equipped with canisters factor and apply it to
211175 C the otr's to get the tampered percentage of carbureted and fuel injected
211176 C cases for hot soak.
211177 C
211178 PCTEQP=EVPTGS(IG3, IHG, IVTAM)
211179 THS(1, IDX, IVTAM)=PCTEQP*OTRCAR
211180 THS(2, IDX, IVTAM)=PCTEQP*OTRINJ
211181 C
211182 C Store the gas cap only tampering values for running loss weighting.
211183 C
211184 GCONLY(IDX, IVTAM)=OTRINJ-OTRCAR
211185 IF(GCONLY(IDX, IVTAM).LT.0.0) GCONLY(IDX, IVTAM)=0.0
211186 C
211187 RETURN
211188 END
```

```

212000      FUNCTION OTCALC(ID,IAYBTR,IHGEVP,IAYEVP)
212001      C
212002      C OTCALC is a REAL-valued function that returns a component of the Overall
212003      C Tampering Rate (OTR) equation.
212004      C
212005      C Called by EVPEME
212006      C
212007      C Input on Call:
212008      C
212009      C   parameter list: ID,IAYBTR,IHGEVP,IAYEVP
212010      C   common blocks:
212011      C   /EVPDAT/ EVPAER
212012      C   TAMEQ2/ BTR
212013      C
212014      C Output on return:
212015      C
212016      C   function: OTCALC
212017      C
212018      C Local variable dictionary:
212019      C
212020      C   Name      Type      Description
212021      C   -----
212022      C   IAYBTR    I        IAY belonging to the BTR portion of the equation
212023      C   IHGEVP    I        IHG belonging to the EVPAER portion of the equation
212024      C   IAYEVP    I        IAY belonging to the EVPAER portion of the equation
212025      C
212026      C Notes:
212027      C
212028      C OTCALC was added for MOBILE4 for AER/EVPAER internal generation.
212029      C OTCALC was modified for MOBILE4, updating common block declarations.
212030      C
212031      C
212032      C   COMMON /EVPDAT/ EVPAER(3,2),EVPTGS(3,2,4),CCEMI(7,4)
212033      C   COMMON /TAMEQ2/ BTR(9,2)
212034      C
212035      C   OTCALC=BTR(ID,IAYBTR)*EVPAER(IHGEVP,IAYEVP)
212036      C
212037      C   RETURN
212038      C
212039      C   END

```

```

213000      SUBROUTINE TECHO(*)
213001      C
213002      C  TECHO determines whether or not to compute the effects groups for the
213003      C  passed in TGSUSE/IQG/IPG values.  If the effects loop is to be completed,
213004      C  TECHO decides what subset of BTR is to be used.
213005      C
213006      C  Called by EFFGRP.
213007      C
213008      C  Input on call:
213009      C
213010      C      common blocks:
213011      C      /LOOKUP/ IQG,IPG
213012      C      /SIZCAL/ TGSUSE
213013      C      /TAMEQ2/ BTR
213014      C
213015      C  Output on return:
213016      C
213017      C      common blocks:
213018      C      /MYCODE/ IAY
213019      C      /SIZCAL/ ATR
213020      C
213021      C  Notes:
213022      C
213023      C  MOBILE4 excludes evaporative HC ( ID(1-7) is now IDBAG(1-5) ).
213024      C
213025      C  TECHO was modified for MOBILE4, updating several common block declarations.
213026      C
213027      C
213028      COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
213029      COMMON /MYCODE/ MY,IDX,JDX,LDXSY,LMYRVT,IAY,IMDXSY,IMKINK
213030      COMMON /SIZCAL/ ATR(5,2),TGSUSE,CSIZE(12,2),CSAE(12)
213031      COMMON /TAMEQ2/ BTR(9,2)
213032      C
213033      C  If technology size is 0, branch to the end of the IQG loop.  If no part
213034      C  of the fleet is so equipped, then no tampering effects based on that
213035      C  equipment type can occur.
213036      C
213037      IF(TGSUSE.EQ.0) RETURN1
213038      C
213039      C  If the technology type does not affect the pollutant group, branch to end
213040      C  of IQG loop.  Tampering vehicles so equipped will not add to the level of
213041      C  the pollutant(s) being emitted.
213042      C
213043      IF(IQG.GE.4.AND.IPG.EQ.1) RETURN1
213044      IF(IQG.LE.3.AND.IPG.EQ.2) RETURN1
213045      C
213046      C  Technology size is positive and tampering it affects the pollutant group.
213047      C  The effects groups will be calculated.  First assign the base rates.
213048      C
213049      DO 20 IAY=1,2
213050      DO 10 IDBAG=1,5
213051      ATR(IDBAG,IAY)=BTR(IDBAG,IAY)
213052      10 CONTINUE
213053      C
213054      C  Zero out rate(s) for case(s) where the type tampering cannot occur, given
213055      C  the technology type.
213056      C
213057      IF(IQG.EQ.3) ATR(1,IAY)=0.0

```

Appendix C: MOBILE4 Subroutine TECHO

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```
213058      IF (IQG.EQ.6) ATR(5,IAY)=0.0
213059      IF (IQG.NE.1.AND.IQG.NE.4) GOTO 20
213060      ATR(2,IAY)=0.0
213061      ATR(3,IAY)=0.0
213062      ATR(4,IAY)=0.0
213063      20 CONTINUE
213064      C
213065      RETURN
213066      END
```

```

214000      SUBROUTINE C1T07(CSFUSE)
214001      C
214002      C C1T07 calculates overlap categories 1 to 7 for tampering effects.
214003      C These cover all the allowable overlap combinations of the 4 base tampering
214004      C cases for the bag effects for the given pollutant group.
214005      C
214006      C Called by ADJ12 and EFFGRP.
214007      C
214008      C Input on call:
214009      C
214010      C   parameter list: CSFUSE
214011      C   common blocks:
214012      C   /LOOKUP/ JPGD
214013      C   /MYCODE/ IAY
214014      C   /SIZCAL/ ATR
214015      C
214016      C Output on return:
214017      C
214018      C   common block: /SIZCAL/ CSIZE
214019      C
214020      C Notes:
214021      C
214022      C   none
214023      C
214024      C
214025      C   DIMENSION CSFUSE (7)
214026      C
214027      C   COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
214028      C   COMMON /MYCODE/ MY,IDX,JDX,LDXSY,LMYRVT,IAY,IMDXSY,IMKINK
214029      C   COMMON /SIZCAL/ ATR(5,2),TGSUSE,CSIZE(12,2),CSAE(12)
214030      C
214031      C The first 7 category sizes are computed directly from the size coefficient
214032      C and tampering rates.
214033      C
214034      C   DO 10 IC7=1,3
214035      C     CSIZE(IC7,IAY)=CSFUSE(IC7)*ATR(JPGD,IAY)
214036      C 10 CONTINUE
214037      C
214038      C   DO 20 IC7=4,7
214039      C     CSIZE(IC7,IAY)=CSFUSE(IC7)*ATR(2,IAY)
214040      C 20 CONTINUE
214041      C
214042      C   RETURN
214043      C   END

```



```

215000      SUBROUTINE C8T012
215001      C
215002      C C8T012 calculates category sizes 8 to 12 for tampering effects.
215003      C Categories 8 to 11 are the no overlap cases (AIRS only, CATS only, etc.).
215004      C Category 12 is no tampering at all case.
215005      C
215006      C Called by ADJ12, A8T011 and EFFGRP.
215007      C
215008      C Input on call:
215009      C
215010      C   common blocks:
215011      C   /MYCODE/ IAY
215012      C   /SIZPAR/ NTERMS,INDXCS
215013      C   /SIZCAL/ CSIZE
215014      C
215015      C Output on return:
215016      C
215017      C   common block: /SIZCAL/ CSIZE
215018      C
215019      C Local array subscripts:
215020      C
215021      C SUB(4) - SUB ( IS )
215022      C
215023      C Local variable / array dictionary:
215024      C
215025      C   Name      Type      Description
215026      C   -----
215027      C CIST11    R      sum of the first 11 category sizes
215028      C NT        I      number of terms in SUB(IS)
215029      C SUB        R      sum of category sizes to be subtracted from ATR to get CSIZE,
215030      C                        given IS, for sizes 8 to 11
215031      C
215032      C Notes:
215033      C
215034      C none
215035      C
215036      C
215037      C   DIMENSION SUB(4)
215038      C
215039      C   COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
215040      C   COMMON /MYCODE/ MY,IDX,JDX,LDSY,LMYRVT,IAY,IMDXSY,IMKINK
215041      C   COMMON /SIZPAR/ NTERMS(4),INDXCS(5,4)
215042      C   COMMON /SIZCAL/ ATR(5,2),TGSUSE,CSIZE(12,2),CSAE(12)
215043      C
215044      C Categories 8 to 12 are derived from the first 7. first sum up the terms to
215045      C be subtracted.
215046      C
215047      C   DO 20 IS=1,4
215048      C   NT=NTERMS(IS)
215049      C   SUB(IS)=0.0
215050      C   DO 10 ICS=1,NT
215051      C   SUB(IS)=SUB(IS)+CSIZE(INDXCS(ICS,IS),IAY)
215052      C 10 CONTINUE
215053      C 20 CONTINUE
215054      C
215055      C   CSIZE(8,IAY)=ATR(JPGD,IAY)-SUB(1)
215056      C   DO 30 IC=9,11
215057      C   IS=IC-7

```

Appendix C: MOBILE4 Subroutine C8T012

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```
215058      CSIZE(IC,IAY)=ATR(IS,IAY)-SUB(IS)
215059      30 CONTINUE
215060      C
215061      C Assign the 12th category size (= no tampering effect) the residual
215062      C percentage.
215063      C
215064          C1ST11=0.0
215065          DO 40 IC11=1,11
215066              C1ST11=C1ST11+CSIZE(IC11,IAY)
215067      40 CONTINUE
215068          CSIZE(12,IAY)=1.0-C1ST11
215069      C
215070          RETURN
215071          END
```

Appendix C: MOBILE4 Subroutine A8T011

May 5, 1989

```

216000      SUBROUTINE A8T011(IC)
216001      C
216002      C A8T011 adjusts effects category sizes when 1 or more of the no overlap
216003      C categories 8 to 11 are negative.
216004      C
216005      C Called by EFFGRP.
216006      C
216007      C Calls C8T012.
216008      C
216009      C Input on call:
216010      C
216011      C   parameter list: IC (flags the negative category size)
216012      C   common blocks:
216013      C   /LOOKUP/ JPGD
216014      C   /MYCODE/ IAY
216015      C   /SIZCAL/ CSIZE
216016      C   /SIZPAR/ NTERMS,INDXCS
216017      C
216018      C Output on return:
216019      C
216020      C   common block: /SIZCAL/ CSIZE
216021      C
216022      C Local array subscripts:
216023      C
216024      C ADJFAC(2) - ADJFAC ( IADJ )
216025      C
216026      C Local variable / array dictionary:
216027      C
216028      C   Name      Type      Description
216029      C   -----
216030      C ADJFAC    R      adjustment factor computed and used to modify CSIZE
216031      C DIV       R      divisor in ADJFAC(1) formula = sum of subset of CSIZE
216032      C NT        R      number of CSIZE terms in DIV
216033      C
216034      C Notes:
216035      C
216036      C none
216037      C
216038      C
216039      C   DIMENSION ADJFAC(2)
216040      C
216041      C   COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
216042      C   COMMON /MYCODE/ MY,IDX,JDX,LDSY,LMYRV, IAY,IMDSY,IMKINK
216043      C   COMMON /SIZCAL/ ATR(5,2),TGSUSE,CSIZE(12,2),CSAE(12)
216044      C   COMMON /SIZPAR/ NTERMS(4),INDXCS(5,4)
216045      C
216046      C Sum up the same terms subtracted off to get CSIZE(IC,IAY).
216047      C
216048      C   IS=IC-7
216049      C   NT=NTERMS(IS)
216050      C   DIV=0.0
216051      C   DO 10 ICS=1,NT
216052      C     JCS=INDXCS(ICS,IS)
216053      C     DIV=DIV+CSIZE(JCS,IAY)
216054      C 10 CONTINUE
216055      C
216056      C Divide the sum into the tamper rate for the no overlap case (no other
216057      C tamper types occurring) case that is being computed. The result is the

```

Appendix C: MOBILE4 Subroutine A8T011

May 5, 1989

```

216058 C first adjustment factor. One minus the result is the second adjustment
216059 C factor.
216060 C
216061 IAD=IS
216062 IF (IAD.EQ.1) IAD=JPGD
216063 ADJFAC(1)=ATR(IAD,IAY)/DIV
216064 ADJFAC(2)=1.0-ADJFAC(1)
216065 C
216066 C Multiply the second adjustment factor times the appropriate IC overlap
216067 C case and add to the related no-IC-occurring overlap case. The uncorrected
216068 C IC values are required for this step. Hence, ADJFAC(2) is applied before
216069 C ADJFAC(1).
216070 C
216071 IF (IC.EQ.8) CSIZE(6,IAY)=CSIZE(6,IAY)+CSIZE(4,IAY)*ADJFAC(2)
216072 IF (IC.EQ.8) CSIZE(7,IAY)=CSIZE(7,IAY)+CSIZE(5,IAY)*ADJFAC(2)
216073 IF (IC.EQ.9) CSIZE(2,IAY)=CSIZE(2,IAY)+CSIZE(4,IAY)*ADJFAC(2)
216074 IF (IC.EQ.9) CSIZE(3,IAY)=CSIZE(3,IAY)+CSIZE(5,IAY)*ADJFAC(2)
216075 IF (IC.EQ.10) CSIZE(1,IAY)=CSIZE(1,IAY)+CSIZE(4,IAY)*ADJFAC(2)
216076 IF (IC.EQ.11) CSIZE(1,IAY)=CSIZE(1,IAY)+CSIZE(5,IAY)*ADJFAC(2)
216077 C
216078 C Multiply the first adjustment factor times each of IC's overlap cases to
216079 C correct their values. This completes the adjustment of sizes 1 to 7.
216080 C
216081 DO 20 ICS=1,NT
216082 JCS=INDEXCS(ICS,IS)
216083 CSIZE(JCS,IAY)=CSIZE(JCS,IAY)*ADJFAC(1)
216084 20 CONTINUE
216085 C
216086 C Recalculate category sizes 8 to 12. Use the same code as used on the
216087 C previous calculation(s).
216088 C
216089 CALL C8T012
216090 C
216091 C Size adjustment for category IC is finished. Note that the process
216092 C increases the size by decreasing the related overlap category sizes. The
216093 C other non-overlap categories will either also increase in size or not be
216094 C affected. Fixing one negative 8-11 size will never drive another 8-11 size
216095 C negative. The code therefore does not have to go back and check for such
216096 C a result.
216097 C
216098 RETURN
216099 END

```

Appendix C: MOBILE4 Subroutine ADJ12

May 5, 1989

```

217000      SUBROUTINE ADJ12(CSF1ST)
217001      C
217002      C ADJ12 adjusts all category sizes to eliminate a negative category 12
217003      C size.
217004      C
217005      C Called by EFFGRP.
217006      C
217007      C Calls CIT07 and C8T012.
217008      C
217009      C Input on call:
217010      C
217011      C   parameter list: CSF1ST
217012      C   common blocks:
217013      C   /LOOKUP/ IPG
217014      C   /MYCODE/ IAY
217015      C   /SIZCAL/ CSIZE
217016      C
217017      C Output on return:
217018      C
217019      C   common block: /SIZCAL/ CSIZE
217020      C
217021      C Local array subscripts:
217022      C
217023      C   CSF2ND(7) - CSF2ND ( IC7 )
217024      C
217025      C Local variable / array dictionary:
217026      C
217027      C   Name      Type      Description
217028      C   -----
217029      C   CSF2ND    R        category size factor for 2nd calculation of CSIZE;
217030      C                       passed to CIT07
217031      C   ADJSUM    R        adjustment factor to scale down 1st calculation of CSIZE
217032      C
217033      C Notes:
217034      C
217035      C ADJ12 was modified for MOBILE4 to add the IGCSF dimension to CSF1ST.
217036      C
217037      C
217038      C   DIMENSION CSF1ST(7,2,2),CSF2ND(7)
217039      C
217040      C   COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
217041      C   COMMON /MYCODE/ MY,IDX,JDX,LDSY,LMYRV,IAY,IMDSY,IMKINK
217042      C   COMMON /SIZCAL/ ATR(5,2),TGSUSE,CSIZE(12,2),CSAE(12)
217043      C
217044      C Adjustment sum is sum of the positive emission effect category sizes.
217045      C
217046      C   ADJSUM=0.0
217047      C   DO 10 IC11=1,11
217048      C   ADJSUM=ADJSUM+CSIZE(IC11,IAY)
217049      C 10 CONTINUE
217050      C
217051      C Apply adjustment sum to all the 1st calculation category size factors
217052      C to get the 2nd calculation size factors.
217053      C
217054      C   DO 20 IC7=1,7
217055      C   CSF2ND(IC7)=ADJSUM*CSF1ST(IC7,IPG,IGCSF)
217056      C 20 CONTINUE
217057      C

```


Appendix C: MOBILE4 Subroutine ADJ12

May 5, 1989

```
217058 C Now recalculate all 12 category sizes. category size 12 will go to 0.0
217059 C (the sum of the first 11 sizes will become 1.0).
217060 C
217061 CALL C1T07(CSF2ND)
217062 CALL C8T012
217063 C
217064 C Check if any of the sizes for 8 to 11 went negative on the recalculation.
217065 C
217066 DO 30 IC=8,11
217067 IF(CSIZE(IC,IAY).LT.0) CALL A8T011(IC)
217068 30 CONTINUE
217069 C
217070 C 2nd adjustments to 8-11 will not drive 12 negative, due to the changed
217071 C CSF's. Hence, we do not need to check 12 again. Checking again would make
217072 C the whole procedure recursive and probably open to infinite loops.
217073 C
217074 RETURN
217075 END
```

```

218000      SUBROUTINE ATPEFF(*)
218001      C
218002      C   ATPEFF applies the anti-tampering effectiveness factors to the 11
218003      C   positive tampering effect categories.
218004      C
218005      C   Called by EFFGRP.
218006      C
218007      C   Input on call:
218008      C
218009      C       common blocks:
218010      C       /EGSCAL/ AER
218011      C       /LOOKUP/ IPG
218012      C       /MYCODE/ IAY
218013      C       /SIZCAL/ CSIZE
218014      C
218015      C   Output on return:
218016      C
218017      C       common block: /SIZCAL/ CSAE
218018      C
218019      C   Local variable dictionary:
218020      C
218021      C   Name      Type      Description
218022      C   -----
218023      C   CIST11    R         sum of first 11 category sizes, assigned as 12th category
218024      C                   size
218025      C
218026      C   Notes:
218027      C
218028      C   none
218029      C
218030      C
218031      C       COMMON /EGSCAL/ AER(11,11,2,2),TGS(11,6,4),EGS(7,2),OPENLP(20,4)
218032      C       COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IMG,IGCSF
218033      C       COMMON /MYCODE/ MY,IDX,JDX,LDSY,LMYRVT,IAY,IMDSY,IMKINK
218034      C       COMMON /SIZCAL/ ATR(5,2),TGSUSE,CSIZE(12,2),CSAE(12)
218035      C
218036      C   The sum of the 11 positive categories will be subtracted from 1.0 to get
218037      C   the 12th, no effect, category.
218038      C
218039      C       CIST11=0.0
218040      C
218041      C   ATP effectiveness modified size ICOL will be the product of the entire
218042      C   unmodified row size vector times the ICOL'th column of the effectiveness
218043      C   matrix for the given pollutant group and pre/post ATP year case.
218044      C
218045      C   The effectiveness matrices are currently identical. Each has the major
218046      C   diagonal all 1.0's and all other cells 0.0. the result of this subroutine
218047      C   is thus to merely echo CSIZE into CSAE with no changes.
218048      C
218049      C       DO 20 ICOL=1,11
218050      C       CSAE(ICOL)=0.0
218051      C
218052      C       DO 10 IROW=1,11
218053      C       CSAE(ICOL)=CSAE(ICOL)+CSIZE(IROW,IAY)*AER(IROW,ICOL,IPG,IAY)
218054      C   10 CONTINUE
218055      C
218056      C       CIST11=CIST11+CSAE(ICOL)
218057      C   20 CONTINUE

```

Appendix C: MOBILE4 Subroutine ATPEFF

May 5, 1989

```
218058 C
218059 C The no effects case is not used hereafter. It is only computed for
218060 C error checking.
218061 C
218062     CSAE(12)=1.0-C1ST11
218063     RETURN
218064     END
```

```

219000      SUBROUTINE SETEGS
219001      C
219002      C SETEGS sets the effects group sizes by combining subsets of the
219003      C overlap category sizes and weighting by the technology group sizes.
219004      C
219005      C Called by EFFGRP.
219006      C
219007      C Input on call:
219008      C
219009      C   common blocks:
219010      C   /LOOKUP/ IQG,IPG
219011      C   /SIZCAL/ TGSUSE,CSAE
219012      C
219013      C Output on return:
219014      C
219015      C   common block: /EGSCAL/ EGS
219016      C
219017      C Local array subscripts:
219018      C
219019      C   INDXEG(6,7,2) - INDXEG ( IC, IEG, IPG )
219020      C   INDXPG(2,2)  - INDXPG ( ILU, IPG )
219021      C   NEGC(7,2)   - NEGC ( IEG, IPG )
219022      C
219023      C Local variable / array dictionary:
219024      C
219025      C   Name      Type      Description
219026      C   -----
219027      C   INDXEG    I         secondary index array: pointers to category sizes
219028      C                       in IEG's size sum, given IPG
219029      C   INDXPG    I         loop indices array: first and last nonzero effects group
219030      C                       sizes, given IPG
219031      C   NC        I         loop test value: number of category sizes in IEG's size
219032      C                       equation, given IPG
219033      C   NEGC      I         loop test values array: looks up NC
219034      C
219035      C Notes:
219036      C
219037      C none
219038      C
219039      C
219040      C   DIMENSION INDXPG(2,2),NEGC(7,2),INDXEG(6,7,2)
219041      C
219042      C   COMMON /EGSCAL/ AER(11,11,2,2),TGS(11,6,4),EGS(7,2),OPENLP(20,4)
219043      C   COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
219044      C   COMMON /SIZCAL/ ATR(5,2),TGSUSE,CSIZE(12,2),CSAE(12)
219045      C
219046      C   DATA INDXPG/1,4, 3,7/,NEGC/1,1,6,4,3*0, 2*0,3,2,1,3,2/
219047      C   DATA INDXEG/
219048      C   1 8,5*0, 8,5*0, 1,4,5,6,7,9, 2,3,10,11,2*0, 6*0, 6*0, 6*0,
219049      C   2 6*0, 6*0, 6,7,9,3*0, 10,11,4*0, 8,5*0, 1,4,5,3*0, 2,3,4*0/
219050      C
219051      C Do not compute group sizes for cases known to be always 0 (5-7 for HC/CO
219052      C and 1-2 for NOX).
219053      C
219054      C   IE1ST=INDXPG(1,IPG)
219055      C   IELST=INDXPG(2,IPG)
219056      C
219057      C Equipment = air pump /catalyst => air pump disablement (air pump only

```

```
219058 C                                     equipped) effects group increment = 0.0
219059 C
219060 C       IF (IQG.EQ.2.AND.IPG.EQ.1) IE1ST=2
219061 C
219062 C       Converse air pump case:
219063 C
219064 C       Equipment = air pump only => only effects group 1 (ap only disabled) > 0.0
219065 C
219066 C       IF (IQG.EQ.1.AND.IPG.EQ.1) IELST=1
219067 C
219068 C       For each effects group IEG, the size is the sum of the product of the
219069 C       related category sizes times the technology group size for the technology
219070 C       type IQG being evaluated on this pass.
219071 C
219072 C       DO 20 IEG=IE1ST,IELST
219073 C
219074 C       Get the number of categories involved in group IEG.
219075 C
219076 C       NC=NEGC(IEG,IPG)
219077 C
219078 C       Now do the sum.
219079 C
219080 C       DO 10 IC=1,NC
219081 C       JCS=INDEXEG(IC,IEG,IPG)
219082 C       EGS(IEG,IPG)=EGS(IEG,IPG)+TGSUSE*CSAE(JCS)
219083 C       10 CONTINUE
219084 C       20 CONTINUE
219085 C
219086 C       RETURN
219087 C       END
```



```

220000      SUBROUTINE REFUEL(ICY)
220001      C
220002      C REFUEL computes the refueling losses HC in grams / mile by relative
220003      C (IDX ordered) model year for the 4 vehicle types affected.
220004      C
220005      C Called by EFCALX.
220006      C
220007      C Input on call:
220008      C
220009      C   parameter list: ICY
220010      C   common blocks:
220011      C   /CITRV1/ RATUNC
220012      C   /CUMCOM/ CUMMIL
220013      C   /FLAGS3/ RLFLAG
220014      C   /IMPAR3/ IM
220015      C   /MAXIMA/ MAXYRS
220016      C   /RLCOM1/ ROADFE,DISPL,SPILL,OBED,OBES,OBDF
220017      C   /RLCOM2/ IOBMV,IVOB,IS2SY,NPHASE,S2EFF (4)
220018      C   /TAMOU2/ TOB
220019      C   /TEMPS/ AMBT,TEMMIN,TEMMAX,TEMEVP
220020      C
220021      C Output on return:
220022      C
220023      C   common blocks:
220024      C   /RLCOM3/ RLRATE
220025      C
220026      C Local array subscripts:
220027      C
220028      C S2LEFT(4)      - S2LEFT ( IVTAM )
220029      C
220030      C Local variable dictionary:
220031      C
220032      C Name      Type      Description
220033      C -----
220034      C IALLYR    I      all stations year: year by which phase in of Stage II vrs
220035      C                      controls is completed => 100% of volume of gas passes through
220036      C                      Stage II vrs.
220037      C IOBCHK     I      check for ob vrs installation, given ob vrs program exists:
220038      C                      1 = no ob vrs    2 = ob vrs installed
220039      C MDX       I      model year index into refueling loss rate arrays
220040      C S2LEFT    R      percentage left of uncontrolled refueling losses after Stage
220041      C                      II controls are applied.
220042      C S2VOL     R      percentage of gasoline pumped that has S2 controls applied.
220043      C
220044      C Notes:
220045      C
220046      C RLFLAG impact:
220047      C
220048      C   1 or (3 & my/iv - use the uncontrolled rl rate (assume no recovery
220049      C   not in OB program) systems installed)
220050      C
220051      C   2 or (4 & my/iv - compute and assign Stage II (S2) only vrs controlled
220052      C   not in OB program)
220053      C
220054      C   3 or 4 and my/iv - weight uncontrolled & controlled rate by best estimate
220055      C   in OB program    of ob vrs tamper rate & its complement, respectively,
220056      C                      to get ob only vrs controlled refueling losses.
220057      C                      Assume 100% installation.

```

Appendix C: MOBILE4 Subroutine REFUEL

May 5, 1989

```

220058 C
220059 C 4 - compute and assign S2 & ob vrs controlled losses.
220060 C See above.
220061 C
220062 C 5 - assign 0.0 (no losses case: results = release MOBILE3).
220063 C
220064 C The factors returned are weighted by their corresponding TF's and summed
220065 C across IDX to get the refueling loss for ICY for each IVTAM.
220066 C
220067 C REFUEL was added for MOBILE4.
220068 C REFUEL was modified for MOBILE4 to add the IGD dimension.
220069 C REFUEL was modified for MOBILE4, updating common block declarations.
220070 C
220071 C
220072 C INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
220073 C
220074 C COMMON /CITRV1/ RVPBAS,RVPIUS,RVPAST,RVPICY,RVPETH,IUSESY,RATUNC
220075 C COMMON /CUMCOM/ CUMMIL(20,8)
220076 C COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
220077 C COMMON /IMPAR3/ IMDX1,IMDX2,IMCASE,IMVEH,IM
220078 C COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
220079 C COMMON /RLCOM1/ ROADFE(32,4),DISPL,SPILL,OBED,OBES,OBDF(4)
220080 C COMMON /RLCOM2/ IOBMV,IVOB(4),IS2SY,NPHASE,S2EFF(4)
220081 C COMMON /RLCOM3/ RLRATE(20,4)
220082 C COMMON /TAMOU2/ TOB(20,4),GCONLY(20,4)
220083 C COMMON /TEMPS/ AMBT,TEMMIN,TEMMA,TEMEXH(3),TEMEVP(6),TEMAST(3)
220084 C
220085 C DIMENSION S2LEFT(4)
220086 C
220087 C Initialize
220088 C
220089 C DO 10 IVTAM=1,4
220090 C DO 10 IDX=1,20
220091 C RLRATE(IDX,IVTAM)=0.0
220092 C 10 CONTINUE
220093 C
220094 C Refueling losses are zero if any evaporative temperature is 40F
220095 C or below, or if min temp is 25F or less, or if the no losses
220096 C case is selected.
220097 C
220098 C IF(TEMMA .LE.40.0 .OR.
220099 C * AMBT .LE.40.0.AND.TEMFLG.EQ.2 .OR.
220100 C * TEMEVP(1).LE.40.0 .OR.
220101 C * TEMEVP(2).LE.40.0 .OR.
220102 C * TEMMIN .LE.25.0 .OR.
220103 C * RLFLAG .EQ. 5) RETURN
220104 C
220105 C If Stage II vrs requested, compute the corresponding cf by IVTAM.
220106 C
220107 C IF(RLFLAG.EQ.1.OR.RLFLAG.EQ.3) GOTO 20
220108 C
220109 C IALLYR=IS2SY+NPHASE
220110 C IF(ICY.LT.IS2SY) S2VOL=0.0
220111 C IF(ICY.GE.IS2SY.AND.ICY.LT.IALLYR) S2VOL=(ICY-IS2SY)/(NPHASE*1.0)
220112 C IF(ICY.GE.IALLYR) S2VOL=1.0
220113 C
220114 C S2LEFT(1)=1.0-S2EFF(1)*S2VOL
220115 C S2LEFT(2)=S2LEFT(1)

```

Appendix C: MOBILE4 Subroutine REFUEL

May 5, 1989

```

220116 S2LEFT(3)=S2LEFT(2)
220117 S2LEFT(4)=1.0-S2EFF(4)*S2VOL
220118 C
220119 C REFUEL is only called once per scenario, computing and saving for later
220120 C use all IVTAM * IDX onboard rl offsets. If RLFLAG = 3, the results are
220121 C 1/M dependent and IMCHEK must be called to determine if and when an 1/M
220122 C program applies.
220123 C
220124 20 IF (RLFLAG.GE.3) CALL IMCHEK(1,ICY,IVTAM,IDX)
220125 DO 40 IVTAM=1,4
220126 IF (RLFLAG.GE.3) CALL IMCHEK(2,ICY,IVTAM,IDX)
220127 DO 30 IDX=1,MXYRS
220128 IF (RLFLAG.GE.3) CALL IMCHEK(3,ICY,IVTAM,IDX)
220129 C
220130 C Setup parameters for this vehicle type and model year combination:
220131 C
220132 JDX=21-IDX
220133 VMTAGE=CUMMIL(JDX,IVTAM)/10000.
220134 MY=ICY+IDX-20
220135 C
220136 IF (MY.LE.1969) MDX=1
220137 IF (MY.GT.1969.AND.MY.LT.2000) MDX=MY-1969+1
220138 IF (MY.GE.2000) MDX=32
220139 C
220140 C RLFLAG = 1: Use uncontrolled refueling loss.
220141 C
220142 IOBCHK=2
220143 IF (MY.LT.IOBMY.OR.IVOB(IVTAM).EQ.1.OR.IDX.EQ.1) IOBCHK=1
220144 IF (RLFLAG.EQ.1.OR.(RLFLAG.EQ.3.AND.IOBCHK.EQ.1))
220145 * RLRATE(IDX,IVTAM)=(RATUNC*DISPL+SPILL)/ROADFE(MDX,IVTAM)
220146 C
220147 C RLFLAG = 2: Calculate Stage II only vrs controlled loss.
220148 C
220149 IF (RLFLAG.EQ.2.OR.(RLFLAG.EQ.4.AND.IOBCHK.EQ.1))
220150 * RLRATE(IDX,IVTAM)=(RATUNC*S2LEFT(IVTAM)*DISPL+SPILL)/
220151 * ROADFE(MDX,IVTAM)
220152 C
220153 C RLFLAG = 3: Calculate an onboard only vrs controlled refueling loss.
220154 C
220155 C Use the evap cannister only (ID = 6) probability of tampering +
220156 C 100% of the given IV x MY fleet is equipped. Obtain the onboard loss by
220157 C weighting the uncontrolled and controlled refueling loss rates by the
220158 C tampering rate and its complement, respectively.
220159 C
220160 IF (RLFLAG.GE.3.AND.IOBCHK.EQ.2) RLRATE(IDX,IVTAM)=
220161 * (RATUNC*(1.0-(1.0-TOB(IDX,IVTAM))*OBED)*DISPL+OBES*SPILL)/
220162 * ROADFE(MDX,IVTAM)+OBDF(IVTAM)
220163 C
220164 C RLFLAG = 4: Calculate S2 & ob vrs controlled refueling loss:
220165 C
220166 C Handled above. Reduces to either RLFLAG=2 or RLFLAG=3 case, depending on
220167 C IOBCHK. Onboard takes precedent over Stage II and you can't get credit for
220168 C both.
220169 C
220170 CONTINUE
220171 C
220172 30 CONTINUE
220173 40 CONTINUE

```

Appendix C: MOBILE4 Subroutine REFUEL

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220174	C	
220175		RETURN
220176		END

```

221000      SUBROUTINE RVPEXH(ICY,IFUEL,RVP1,RVP2)
221001      C
221002      C MOBILE4 calculates a correction factor array to adjust the base emission
221003      C factor for fuel volatility (= Reid Vapor Pressure = RVP). This
221004      C multiplicative cf is neutral (= 1.0) only when (1) the actual RVP <= 9.0
221005      C (= the RVP of the fuel used in the tests upon which the ber slopes and
221006      C intercepts in Block Data are based) and / or (2) the ambient temperature
221007      C (TEMAST) is <= 40.0 (below 40 degrees there is no volatility effect) & / or
221008      C the vehicle class is not equipped in the given MY with the technology known
221009      C by testing to be subject to an RVP exhaust effect on the given pollutant.
221010      C Thus the effect depends on IP and MY as well as RVP and TEMAST.
221011      C
221012      C There are 3 nonneutral cases. RVPEXH computes the MYG 1 HC & CO case,
221013      C as well as initializing the cf array to 1.0 to cover the neutral cases.
221014      C BIGTCF computes the 2 operating mode ("bag") dependent cases: MYGs 2 & 3
221015      C >= 75 degrees and MYGs 2 & 3 < 75 degrees.
221016      C
221017      C Called by EFCALX.
221018      C
221019      C Calls AMINI, IGRVPT and OUTPOL.
221020      C
221021      C Input on call:
221022      C
221023      C   parameter list: ICY,IFUEL,RVP1,RVP2
221024      C   common blocks:
221025      C   /CITCIN/ ICERSW
221026      C   /CITRV2/ RVP090
221027      C   /MAXIMA/ MAXPOL,MAXYRS
221028      C   /RVPEX1/ R9G1,TLL
221029      C   /RVPNAT/ ICERSY
221030      C   /TEMPS/ TEMAST
221031      C
221032      C Output on return:
221033      C
221034      C   common blocks:
221035      C   /RVPEX2/ RVPCF
221036      C
221037      C Local variable dictionary:
221038      C
221039      C   Name      Type      Description
221040      C   -----
221041      C   CFB        R        RVP cf at begin point of temperature interpolation interval
221042      C   CFL        R        RVP cf at end point of temperature interpolation interval
221043      C   RADJCF     R        RVP cf assessed at FTP (75.0) temperature - accounts only for
221044      C                                     RVP deviation from norm, not temperature.
221045      C   REAT       R        RVP exhaust IP temperature adjusted for ASTM class
221046      C
221047      C Notes:
221048      C
221049      C RVPEXH was added for MOBILE4.
221050      C RVPEXH was modified in MOBILE4.
221051      C
221052      C
221053      COMMON /CITCIN/ UDI(5),IUDI,CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW
221054      COMMON /CITRV2/ RVPHS1,RVPHS2,RVPET1,RVPET2,RVP090,RVP100,RVP115
221055      COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
221056      COMMON /RVPEX1/ R9G1(3,2),RG23(3,3,3,2),TLL(2)
221057      COMMON /RVPEX2/ MYGRVP(4,4),RVPCF(20,3,4,2),OPENCR

```


Appendix C: MOBILE4 Subroutine RVPEXH

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```

221058      COMMON /RVPNAT/ ICERSY,RVPCER,RVPLIM(2),RVPDIU(2),PFUL,EINCR
221059      COMMON /TEMPS/  AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
221060      C
221061      C Determine pollutants.
221062      C
221063      CALL OUTPOL(IP1,IP2)
221064      C
221065      C Initialize the RVP exhaust correction factor to the neutral 1.0 and depart,
221066      C if no IVTAM x IP x IDX cases will be in the "not-by-bag" computed category.
221067      C
221068      DO 10 IVTAM=1,4
221069      DO 10 IP=IP1,IP2
221070      DO 10 IDX=1,MAXYRS
221071      RVPCF(IDX,IP,IVTAM,IFUEL)=1.0
221072      10 CONTINUE
221073      C
221074      C The RVPCF algorithm applies only to HC & CO (not NOx) and MYG 1 (1970-79
221075      C for LDGV, 1970-80 for LDGT1, 1978-80 for LDGT2, no MYG 1 for HDGV).
221076      C
221077      IF((IP1.EQ.3.AND.IP2.EQ.3).OR.ICY.GE.2000) RETURN
221078      C
221079      C Reduce supplied RVPs to 11.7 for the RVP of calculation only.
221080      C
221081      RVP1=AMIN1(RVP1,11.7)
221082      RVP2=AMIN1(RVP2,11.7)
221083      C
221084      C Now can identify and compute the "not-by-bag" cases for LDGV/T.
221085      C
221086      DO 30 IVTAM=1,3
221087      DO 30 IP=IP1,IP2
221088      IF(IP.EQ.3) GOTO 30
221089      C
221090      C If IP's temperature is <= 40 degrees, then skip this IP iteration.
221091      C If it is above 95 degrees, then reduce it to 95 for this computation.
221092      C
221093      IF(TEMAST(IP).LE.40.0) GOTO 30
221094      REAT=AMIN1(TEMAST(IP),95.0)
221095      C
221096      DO 20 IDX=1,MAXYRS
221097      MY=ICY+IDX-20
221098      IG=IGRVPT(MY,IVTAM)
221099      C
221100      C If MYG 0, then no computation is needed for this MY. Do next IDX iteration.
221101      C If MYG 2 has been reached, further calculations for this IVTAM x IP case
221102      C will be done in BIGTCF, so exit IDX loop.
221103      C
221104      IF(IG.EQ.0) GOTO 20
221105      IF(IG.GT.1) GOTO 30
221106      C
221107      C Use base or in-use (whichever applies, given ICY) RVP, unless MY is a
221108      C certification controlled year, in which case the RVP is normalized by the
221109      C certification RVP. If the selected RVP is <= 9.0, skip the computation.
221110      C Since RVP1 >= RVP2, then once RIVAL <= 9.0, exit IDX loop, not just 1
221111      C iteration.
221112      C
221113      RIVAL=RVP1
221114      IF(ICERSW.EQ.2.AND.MY.GE.ICERSY) RIVAL=RVP2
221115      IF(RIVAL.LE.RVP090) GOTO 30

```

```
221116 C
221117 C Compute the cf. There are 2 cases, regarding temperature.
221118 C
221119 C (1) Temperature is neutral.
221120 C
221121 RADJCF=(R9G1(1,IP)+R9G1(2,IP)*RIVAL)/R9G1(3,IP)
221122 IF (REAT.EQ.75.0) RVPCF(IDX,IP,IVTAM,IFUEL)=RADJCF
221123 IF (REAT.EQ.75.0) GOTO 20
221124 C
221125 C (2) Temperature is a variable in the RVP cf calculation. Interpolate
221126 C between 2 cf's computed at temperatures for which data exists.
221127 C
221128 C (a) First assign the endpoints at 40 and 75 degrees.
221129 C
221130 CFB=1.0
221131 CFL=RADJCF
221132 C
221133 C (b) Now interpolate between the 2 endpoints (CFB,CFL) or extrapolate
221134 C beyond CFL (up to 95), using actual (REAT) and (TLL) temperatures.
221135 C
221136 RVPCF(IDX,IP,IVTAM,IFUEL)=
221137 * CFB+(CFL-CFB)*(REAT-TLL(1))/TLL(2)
221138 C
221139 20 CONTINUE
221140 30 CONTINUE
221141 C
221142 RETURN
221143 END
```

Appendix C: MOBILE4 Subroutine BIGCFX

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```

222000      SUBROUTINE BIGCFX(ICY)
222001      C
222002      C BIGCFX computes correction factors applied to composite emission
222003      C factors, e.g., speed, optional (humidity, trailer towing, a/c), temperature,
222004      C by-bag RVP, operating mode, methane and tampering.
222005      C
222006      C Called by EFCALX.
222007      C
222008      C Calls BIGALH, BIGIN1, BIGIN2, BIGMET, BIGOMT, BIGSAL, BIGTAM and BIGTCF.
222009      C
222010      C Input on call:
222011      C
222012      C     parameter list: ICY
222013      C     common blocks:
222014      C     /FLAGS2/ ALHFLG
222015      C     /FLAGS4/ PRTFLG,NMHFLG
222016      C     /MAXIMA/ MAXVEH,MAXPOL,MAXYRS
222017      C     /TEMPC3/ MDLOHI
222018      C
222019      C Output on return:
222020      C
222021      C     common blocks:
222022      C     /TEMPC4/ LOWCO
222023      C
222024      C Notes:
222025      C
222026      C BIGCFX was modified for MOBILE4.
222027      C
222028      C
222029      C     INTEGER ALHFLG
222030      C     INTEGER PRTFLG,HCFLAG
222031      C
222032      C     COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
222033      C     COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
222034      C     COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
222035      C     COMMON /TEMPC3/ MDLOHI (3),TDIFF (3),CHFRAC (3),TCFF (3,2),TCF (3)
222036      C     COMMON /TEMPC4/ MYGCOO (3),LOWCO,COOTFC (3),COOTFD (3)
222037      C
222038      C Initialize variables to be used in upcoming loops.
222039      C
222040      C     CALL BIGIN1
222041      C     IF (ALHFLG.GT.1) CALL BIGALH(ICY)
222042      C
222043      C Enter the correction factor loops.
222044      C
222045      C     DO 10 IDX=1,MAXYRS
222046      C     JDX=21-IDX
222047      C     MY=ICY-(20-IDX)
222048      C
222049      C     DO 10 IV=1,MAXVEH
222050      C     CALL BIGIN2 (IV,MY,JDX,IVLM,IVTEMP,ISP)
222051      C
222052      C     DO 10 IP=1,MAXPOL
222053      C     IF (PRTFLG.NE.IP.AND.PRTFLG.NE.4) GOTO 10
222054      C
222055      C Reset CO offset switch and calculate temperature correction factor (TCF).
222056      C There is no TCF in MOBILE4 for diesel IV (IVTEMP=0). When the ambient
222057      C temperature is the FTP standard 75 degrees (MDLOHI=0), TCF represents the

```

Appendix C: MOBILE4 Subroutine BIGCFX

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```
222058 C RVP CF for RVP MYG cases 2 and 3 for LDGV/T & HDGV, otherwise it remains the
222059 C initialized default neutral value (1.0) for all IV (1-8).
222060 C
222061 C     LOWCO=1
222062 C     IF (IVTEMP.GE.1) CALL BIGTCF(IP,IVTEMP,MY,IDX)
222063 C
222064 C Compute speed and, if LDGV/T or MC, optional variables correction factor.
222065 C
222066 C     CALL BIGSAL(IP,IV,MY,IDX,ISP)
222067 C
222068 C Check for and calculate if needed the methane offset to composite HC.
222069 C
222070 C     IF (IP.EQ.1.AND.NMHFLG.EQ.2) CALL BIGMET(IV,MY,IDX)
222071 C
222072 C If LDGV/T or HDGV, correct tampering offset for opmode and temperature.
222073 C
222074 C     IF (IV.LE.4) CALL BIGTAM(IP,IV,IDX)
222075 C
222076 C Compute bef's multiplicative correction for operating mode and temperature.
222077 C
222078 C     CALL BIGOMT(IP,IV,IVLM,MY,IDX)
222079 C
222080 C 10 CONTINUE
222081 C
222082 C     RETURN
222083 C     END
```

```

223000      SUBROUTINE BIGIN1
223001      C
223002      C BIGIN1 sets up the BIGCFX coefficient calculations loops by initializing
223003      C parameters and variables / arrays used in those calculations. For example,
223004      C BIGIN1 evaluates the 5th degree polynomial speed correction factor
223005      C equation for all 8 IV, 3 IP and 21 IG. For HC, CO and 1 case of NOx, the
223006      C results are exponentiated.
223007      C
223008      C Called by BIGCFX.
223009      C
223010      C Input on call:
223011      C
223012      C   common blocks:
223013      C   /MAXIMA/ MAXVEH,MAXPOL,MAXYRS
223014      C   /SCENE1/ SPD,PCCN,PCHC,PCCC
223015      C   /SPEED1/ SK1
223016      C   /SPEED4/ MAXSP1
223017      C   /TEMPS/ TEMEXH
223018      C
223019      C Output on return:
223020      C
223021      C   common blocks:
223022      C   /OFFSET/ OFFCO
223023      C   /SCENE2/ FCC,FCN,FHC,FHN
223024      C   /SPEED3/ SADJ,SCUNAI
223025      C   /TEMPC3/ MDLOHI,TDIFF
223026      C
223027      C Local array subscripts:
223028      C
223029      C FTPSPD(3) - FTPSPD ( IB )
223030      C
223031      C Local variable dictionary:
223032      C
223033      C   Name      Type      Description
223034      C   -----
223035      C AVEspd      R      average speed for the vehicle type IV
223036      C FTPSPD      R      FTP standard speeds for the 3 operating modes
223037      C FTPT        R      FTP standard temperature
223038      C ICOEF5      I      pointer to term in 5th degree polynomial scf equation
223039      C ISADJ       I      integer location used in rounding the scenario's SADJ
223040      C              for 1 used & then restored for a later use)
223041      C SCF         R      speed correction factor for the given IV, IP and IG
223042      C
223043      C Notes:
223044      C
223045      C Although calculated for all 8 IV, SCUNAI results are only used by BIGCFX for
223046      C subgroup IVA (LDGV, LDGT1/2, MC).
223047      C BIGIN1 was modified in MOBILE4.
223048      C
223049      C
223050      COMMON /MAXIMA/ MAXVEH,MAXLTH,MAXPOL,MAXREG,MAXYRS
223051      COMMON /OFFSET/ OFFCO(20,3),OFFMTH(20,8)
223052      COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
223053      COMMON /SCENE2/ FCC,FCN,FHC,FHN
223054      COMMON /SPEED1/ SK1(6,18,3),SK2C(2,14,2,3),SKG(2,6,2),SK2N(3,14,3)
223055      COMMON /SPEED3/ SADJ,SCUNAI(18,3,8),SCADJ1(3,4),ISGRP(3,4)
223056      COMMON /SPEED4/ MAXSP1,LB1STS(3),LBLAST,IVB,IVA
223057      COMMON /TEMPC3/ MDLOHI(3),TDIFF(3),CHFRAC(3),TCFF(3,2),TCF(3)

```


Appendix C: MOBILE4 Subroutine BIGIN1

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```

223058      COMMON /TEMPS/  AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
223059      C
223060      DIMENSION FTPSPD(3)
223061      C
223062      DATA FTPSPD/26.0,16.0,26.0/,FTPT/75.0/
223063      C
223064      C Compute operating mode fractions.
223065      C
223066      FCN=PCCN*.01
223067      FHC=PCHC*.01
223068      FCC=PCCC*.01
223069      FHN=(FCC-FCN)+FHC
223070      C
223071      C Setup for temperature correction factor loop: decide TCF case.
223072      C
223073      DO 10 IP=1,MAXPOL
223074      TDIFF(IP)=TEMEXH(IP)-FTPT
223075      IF (TDIFF(IP).EQ.0) MDLOHI(IP)=0
223076      IF (TDIFF(IP).LT.0) MDLOHI(IP)=1
223077      IF (TDIFF(IP).GT.0) MDLOHI(IP)=2
223078      10 CONTINUE
223079      C
223080      C Zero out OFFCO.
223081      C
223082      DO 20 IV=1,3
223083      DO 20 IDX=1,MAXYRS
223084      OFFCO(IDX,IV)=0.0
223085      20 CONTINUE
223086      C
223087      C Calculate average speed for the operating mode fractions.
223088      C
223089      SADJ=PCCC/FTPSPD(1)
223090      -   +(100.-PCCC-PCHC)/FTPSPD(2)
223091      -   +PCHC/FTPSPD(3)
223092      SADJ=100./SADJ
223093      ISADJ=SADJ*10.+0.5
223094      SADJ=ISADJ/10.
223095      C
223096      C Build the 5th degree polynomial ("old") equation unadjusted scf table.
223097      C
223098      DO 40 IV=1,MAXVEH
223099      AVESPD=SPD(IV)
223100      C
223101      DO 40 IP=1,MAXPOL
223102      C
223103      DO 40 ISP=1,MAXSPI
223104      SCF=SK1(6,ISP,IP)
223105      C
223106      DO 30 ICOEF5=1,5
223107      SCF=SCF*AVESPD+SK1(6-ICOEF5,ISP,IP)
223108      30 CONTINUE
223109      C
223110      IF (IP.NE.3) SCF=EXP(SCF)
223111      SCUNA1(ISP,IP,IV)=SCF
223112      40 CONTINUE
223113      C
223114      RETURN
223115      END

```

```

224000      SUBROUTINE BIGALH(ICY)
224001      C
224002      C BIGALH computes emission correction factors for air conditioning, extra
224003      C loading, trailer towing and humidity for vehicle types LDGV, LDGT1, LDGT2
224004      C and LDGT (composite of LDGT1 & LDGT2). Additionally, the humidity
224005      C correction is applied to MC vehicles.
224006      C
224007      C Called by BIGCFX.
224008      C
224009      C Calls IGEPTR, IGLPTR, IGTPTTR and IGUPTR.
224010      C
224011      C Input on call:
224012      C
224013      C   parameter list: ICY
224014      C   common blocks:
224015      C   /ALUHAC/ ACEQIP,ACCF
224016      C   /ALUHIN/ XLOAD,TRAILR,ABSHUM,DB,WB
224017      C   /ALUHLT/ XLCF,TWCF
224018      C   /MAXIMA/ MAXLTW,MAXPOL,MAXYRS
224019      C   /REGION/ IREJN
224020      C   /TEMPS/ TEMEXH
224021      C
224022      C Output on return:
224023      C
224024      C   common blocks:
224025      C   /ALUHIN/ AC
224026      C   /ALUOUT/ ALHRET
224027      C
224028      C Local array subscripts:
224029      C
224030      C   TDIFF(3) - TDIFF ( IP )
224031      C
224032      C Local variable dictionary:
224033      C
224034      C   Name      Type      Description
224035      C   ----      -
224036      C   ACU        R        fraction of vehicles that are equipped with air conditioning
224037      C                        and are using it
224038      C   DI          R        discomfort index computed from the user supplied (default)
224039      C                        values of dry bulb (db) and wet bulb (wb) temperatures
224040      C   DIHI        R        high reference temperature for DI: above this temperature
224041      C                        AC is on (100% use)
224042      C   DILO        R        low reference temperature for DI: below this temperature
224043      C                        AC is off (0% use)
224044      C   HH          R        HC or CO => 1.; NOx => humidity correction factor
224045      C   HHH         R        HC or CO => 1.; NOx => humidity correction factor
224046      C   TDIFF       R        deviation from FTP standard temperature (75 degrees F)
224047      C   TWU         R        fraction of vehicles towing a trailer
224048      C   XLU         R        fraction of vehicle s with an extra load
224049      C
224050      C Notes:
224051      C
224052      C BIGALH was modified in MOBILE4.
224053      C
224054      C
224055      C   COMMON /ALUHAC/ ACEQIP(8,3,2),ACCF(2,3,2,3,2)
224056      C   COMMON /ALUHIN/ AC,XLOAD(3),TRAILR(3),ABSHUM,DB,WB
224057      C   COMMON /ALUHLT/ XLCF(3,6,3,2),TWCF(3,6,3,2)

```

Appendix C: MOBILE4 Subroutine BIGALH

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```

224058      COMMON /ALUOUT/ ALHRET(20,4,3)
224059      COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
224060      COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
224061      COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
224062      COMMON /TEMPS/ AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
224063      C
224064      DIMENSION TDIFF(3)
224065      C
224066      DATA DILO/70./
224067      DATA DIHI/80./
224068      C
224069      IF (AC.EQ.0.0) GOTO 10
224070      C
224071      C Compute AC based on discomfort index DI.
224072      C
224073      DI=(DB+WB)*.4+15.
224074      AC=(DI-DILO)/(DIHI-DILO)
224075      IF (AC.LT.0.0) AC=0.0
224076      IF (AC.GT.1.) AC=1.
224077      C
224078      C Setup humidity correction factors.
224079      C
224080      10 DO 20 IP=1,MAXPOL
224081          TDIFF(IP)=TEMEXH(IP)-75.
224082      20 CONTINUE
224083      C
224084      HHH=1.-0.00380*(ABSHUM-75.)
224085      C
224086      C Assign MC only for IP=3.
224087      C
224088      DO 30 IDX=1,MAXYRS
224089          ALHRET(IDX,4,1)=1.
224090          ALHRET(IDX,4,2)=1.
224091          ALHRET(IDX,4,3)=HHH
224092      30 CONTINUE
224093      C
224094      C Assign other vehicle correction factors.
224095      C
224096      DO 50 IVA=1,MAXLTW
224097          XLU=XLOAD(IVA)
224098          TWU=TRAILR(IVA)
224099      C
224100      DO 40 IDX=1,MAXYRS
224101          MY=ICY-(20-IDX)
224102          IGU=IGUPTR(MY,IVA)
224103          IGE=IGEPTR(MY,IVA)
224104          IGL=IGLPTR(MY,IVA)
224105          IGT=IGTPTR(MY,IVA)
224106          ACU=ACEQIP(IGE,IVA,IREJN)*AC
224107      C
224108      DO 40 IP=1,MAXPOL
224109          HH=1.
224110          IF (IP.EQ.3) HH=HHH
224111          ALHRET(IDX,IVA,IP)=
224112      *      ((ACCF(2,IP,IGU,IVA,IREJN)*TDIFF(IP)
224113      *      +ACCF(1,IP,IGU,IVA,IREJN)-1.)*ACU+1.)
224114      *      *((XLCF(IP,IGL,IVA,IREJN)-1.)*XLU+1.)
224115      *      *((TWCF(IP,IGT,IVA,IREJN)-1.)*TWU+1.)

```

Appendix C: MOBILE4 Subroutine BIGALH

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```
224116      *  *HH
224117      40 CONTINUE
224118      C
224119      50 CONTINUE
224120      C
224121      RETURN
224122      END
```

```

225000      SUBROUTINE BIGIN2(IV,MY,JDX,IVLM,IVTEMP,ISP)
225001      C
225002      C  BIGIN2 initializes the vehicle class specific parameters and flags used
225003      C  subsequently by BIGCFX in the calculation of emission factor correction
225004      C  factors and offsets.
225005      C
225006      C  Called by BIGCFX.
225007      C
225008      C  Calls ISPPTR.
225009      C
225010      C  Input on call:
225011      C
225012      C    parameter list: IV,MY,JDX
225013      C    common blocks:
225014      C    /CUMCOM/ CUMMIL
225015      C    /IVPCOM/ IVPTRL,IVPTRT,IVPTRA,IVPTRB
225016      C    /SCENE2/ FCC,FCN,FHC,FHN
225017      C    /SPEED4/ LB1STS
225018      C    /TAMEQ1/ F50K
225019      C
225020      C  Output on return:
225021      C
225022      C    parameter list: IVLM,IVTEMP,ISP
225023      C    common blocks:
225024      C    /OPMOD2/ MYSTEP
225025      C    /OPMOD3/ BFMILE,KINKBF,BFGT50
225026      C    /SPEED4/ IVB,IVA
225027      C    /TEMPC3/ CHFRAC,TCF
225028      C
225029      C  Local array subscripts:
225030      C
225031      C  NCATYR(8)          -  NCATYR ( IV )
225032      C
225033      C  Local variable / array dictionary:
225034      C
225035      C    Name      Type      Description
225036      C    -----
225037      C  NCATYR      I          last non-catalyst MY for the given IV
225038      C
225039      C  Notes:
225040      C
225041      C  BIGIN2 was added for MOBILE4.
225042      C  BIGIN2 was modified for MOBILE4, updating several common block declarations
225043      C  and adding 1984+ LDGT1/2 processing.
225044      C
225045      C
225046      COMMON /CUMCOM/ CUMMIL (20,8)
225047      COMMON /IVPCOM/ IVPTRL (8) ,IVPTRT (8) ,IVPTRA (8) ,IVPTRB (8)
225048      COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
225049      COMMON /OPMOD2/ MYSTEP,MAXBFR,MYGBFR (8,3,6)
225050      COMMON /OPMOD3/ BFMILE,KINKBF,BFGT50
225051      COMMON /SCENE2/ FCC,FCN,FHC,FHN
225052      COMMON /SPEED4/ MAXSPI,LB1STS (3) ,LBLAST,IVB,IVA
225053      COMMON /TAMEQ1/ TAMZML (9,4,2,2) ,TAMDR (9,4,3,2) ,MYGTAM (4) ,IGT5,F50K
225054      COMMON /TEMPC3/ MDLOHI (3) ,TDIFF (3) ,CHFRAC (3) ,TCFF (3,2) ,TCF (3)
225055      C
225056      DIMENSION NCATYR (8)
225057      DATA NCATYR/1974,1974,1978,1983,2020,2020,2020,2020/

```



```
225058 C
225059     IVLM=IVPTRL(IV)
225060     IVTEMP=IVPTRT(IV)
225061     IVA=IVPTRA(IV)
225062     IVB=IVPTRB(IV)
225063     IF(IVLM.EQ.0) RETURN
225064 C
225065 C   Reinitialize TCF to neutral (no effect) value for diesel IV (Wipe HDGV NOx
225066 C   TCF, else it would be used for IP=1-3 / IV=5-7, for which TCF is not calc.).
225067 C
225068     IF(IV.NE.5) GOTO 20
225069     DO 10 IB=1,3
225070     TCF(IB)=1.0
225071     10 CONTINUE
225072 C
225073     20 GOTO(30,30,30,40,40,40),IVLM
225074     30 IF(MY.LT.LB1STS(IVLM)) ISP=ISPTR(MY,0,IVLM,1)
225075     40 BFMILE=CUMMIL(JDX,IV)*.0001
225076 C
225077 C   Select bag coefficients based on vehicle class and model year
225078 C
225079     MYSTEP=1
225080     IF(MY.LT.1981.OR.IVLM.GT.3) GOTO 50
225081     IF(MY.LT.1984.AND.IVLM.GT.1) GOTO 50
225082 C
225083 C   Use yearly stepped bag coefficients for 1981+ LDGV and 1984+ LDGT1/2.
225084 C   1981+ LDGV class has bag fraction coefficients curve kink at 50K miles.
225085 C
225086     MYSTEP=2
225087     KINKBF=1
225088     IF(IVLM.EQ.1.AND.BFMILE.GT.F50K) KINKBF=2
225089     IF(KINKBF.EQ.2) BFGT50=BFMILE-F50K
225090 C
225091 C   Assign cold/hot fractions by model year group.
225092 C
225093     50 CHFRAC(1)=FCN
225094     CHFRAC(3)=FHN
225095     IF(MY.LE.NCATYR(IV)) GOTO 60
225096     CHFRAC(1)=FCC
225097     CHFRAC(3)=FHC
225098     60 CHFRAC(2)=1.-CHFRAC(1)-CHFRAC(3)
225099 C
225100     RETURN
225101     END
```

```

226000      SUBROUTINE BIGTCF(IP,IVTEMP,MY,IDX)
226001      C
226002      C BIGTCF computes the multiplicative temperature correction factor and, in
226003      C some cases, the RVP cf and/or the additive temperature CO offset.
226004      C
226005      C Called by BIGCFX.
226006      C
226007      C Calls IGRVPT, ITCPTR, IEVPTR and BIGRVP.
226008      C
226009      C Input on call:
226010      C
226011      C   parameter list: IP,IVTEMP,MY,IDX
226012      C   common blocks:
226013      C   /CITPAR/ FRETH,FRMETH,FRGAS
226014      C   /CITRV3/ RVPX
226015      C   /INJECT/ PFI
226016      C   /TEMPC1/ TTFC,TTFD,TT4,TT8
226017      C   /TEMPC2/ MYGTFD,ISHIFT
226018      C   /TEMPC3/ MDLOHI,TDIFF,CHFRAC
226019      C   /TEMPC4/ MYGCOO,LOWCO,COOTFC,COOTFD
226020      C   /TEMPS/ TEMAST
226021      C
226022      C Output on return:
226023      C
226024      C   common blocks:
226025      C   /OFFSET/ OFFCO
226026      C   /TEMPC3/ TCF
226027      C
226028      C Local array subscripts:
226029      C
226030      C   FRFDS(3) - FRFDS ( IFDS )
226031      C
226032      C Local variable / array dictionary:
226033      C
226034      C   Name      Type      Description
226035      C   -----
226036      C   COOFDS    R        sum of CO offsets by FDS weighted by FDS sales fractions
226037      C   FRFDS     R        fraction of class IVTEMP given MY that is IFDS equipped
226038      C   HDGTCTF   R        HDGV T CF - HDGV testing does not use the LDG operating modes,
226039      C                   so multiply the 1 HDGTCTF x each of the RVP CFs in TCF(IB).
226040      C   TFCB      R        tcf by bag for fuel delivery systems combined case
226041      C   TFDS      R        FDS weighted low tcf bag equation coefficient
226042      C
226043      C Notes:
226044      C
226045      C   For low tcf, LDGV/T use the additive CO offset starting in MYGCOO(IVTEMP) &
226046      C   are differentiated by fuel delivery system (carbureted vs fuel injected)
226047      C   starting in MYGTFD(IVTEMP). The CO offset start year precedes the fds start
226048      C   year in all 3 cases. Hence, BIGTCF checks the LOWCO flag on both the LDG
226049      C   MYGTFD keyed branches.
226050      C
226051      C   BIGTCF was added for MOBILE4.
226052      C   BIGTCF was modified for MOBILE4, adding BIGRVP.
226053      C
226054      C
226055      C   CHARACTER*4 SCNAME
226056      C   CHARACTER*1 ASTMCL,AClass
226057      C

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226058      COMMON /CITPAR/ SCNAME (4),FRETH,FRMETH,FRGAS
226059      COMMON /CITRV3/ RVPX (2,2),ICLASS,ASTMCL,AClass (5)
226060      COMMON /INJECT/ TBI (13,4),PFI (13,4),MAXFIY,MINFIY
226061      COMMON /OFFSET/ OFFCO (20,3),OFFMTH (20,8)
226062      COMMON /TEMPC1/ TTFC (2,3,9,3),TTFD (3,3,3),TT4 (2,6,3),TT8 (2,3,4,3)
226063      COMMON /TEMPC2/ MAXTCF,MYGTCF (9,3,5),MYGTFD (3),IShift
226064      COMMON /TEMPC3/ MDLOHI (3),TDIFF (3),CHFRAC (3),TCFF (3,2),TCF (3)
226065      COMMON /TEMPC4/ MYGCOO (3),LOWCO,COOTFC (3),COOTFD (3)
226066      COMMON /TEMPS/ AMBT,TEMMin,TEMMax,TEMExH (3),TEMEVP (6),TEMAST (3)
226067      C
226068      DIMENSION TFCB (3),TFDS (3)
226069      C
226070      DIMENSION FRFDS (3)
226071      C
226072      C Initialize TCF to the neutral (no correction) value.
226073      C
226074      DO 10 IB=1,3
226075      TCF (IB)=1.0
226076      10 CONTINUE
226077      C
226078      C First cases evaluated are the new combined high temperature and RVP cf
226079      C algorithm and bag dependent low temperature RVP cf cases. Check these first
226080      C because their year ranges are mostly likely to be evaluated.
226081      C
226082      IF (IVTEMP.GT.4) GOTO 30
226083      IG=IGRVPT (MY,IVTEMP)
226084      IF (IG.LE.1.OR.TEMAST (IP).LE.40.0) GOTO 30
226085      CALL BIGRVP (IP,IG,1,RVPX (1,1),RVPX (2,1))
226086      IF (FRETH.GT.0.0)
226087      * CALL BIGRVP (IP,IG,2,RVPX (1,2),RVPX (2,2))
226088      C
226089      DO 20 IB=1,3
226090      TCF (IB)=(FRGAS+FRMETH)*TCFF (IB,1)+FRETH*TCFF (IB,2)
226091      20 CONTINUE
226092      C
226093      C High temperature and RVP combined cf case is done.
226094      C
226095      IF (MDLOHI (IP).EQ.2) RETURN
226096      C
226097      C All RVP cf calculations are done. If T is neutral, no T cf occurs.
226098      C For the IG >= 2 case returned from BIGRVP, pass on the RVP cf in TCF.
226099      C
226100      30 IF (MDLOHI (IP).EQ.0) RETURN
226101      C
226102      C At this point, TCF (IB) = 1.0, if IV = MC or IG <= 1 or (IG > 1 & T = low)
226103      C RVP cf, if IG >= 2 & T < 75.0
226104      C Hence, the formulas below for the multiplicative tcf cases are all of the
226105      C form "TCF (IB)=f(---)*TCF (IB)". The result is either a tcf or the product
226106      C by bag tcf * RVP cf.
226107      C
226108      GOTO (40,40,40,70,80),IVTEMP
226109      C
226110      C Low for all MY & high for RVP MYGs 0 & 1 TCF for LDGV, LDGT1, and LDGT2.
226111      C
226112      40 IF (IP.EQ.2.AND.MDLOHI (IP).EQ.1.AND.MY.GE.MYGCOO (IVTEMP)) LOWCO=2
226113      IF (MY.GE.MYGTFD (IVTEMP)) GOTO 50
226114      C
226115      C IVLDG multiplicative low & high tcf with FDS combined.

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226116 C
226117     IT=ITCPTR(MY,IP,IVTEMP)
226118     DO 45 IB=LOWCO,3
226119         TFCB(IB)=TTFC(MDLOHI(IP),IB,IT,IP)
226120         TCF(IB)=EXP(TFCB(IB)*TDIFF(IP))*TCF(IB)
226121     45 CONTINUE
226122         IF(LOWCO.EQ.1) RETURN
226123 C
226124 C   IVLDG additive low temperature CO offset with FDS combined.
226125 C
226126     IGO=IT-ISHIFT
226127     OFFCO(IDX,IVTEMP)=COOTFC(IGO)*TDIFF(IP)*CHFRAC(1)
226128     RETURN
226129 C
226130 C   IVLDG multiplicative low tcf with FDS differentiated.
226131 C
226132     50 IG5=IEVPTR(MY,0,IVTEMP,2)
226133     FRFDS(2)=TBI(IG5,IVTEMP)
226134     FRFDS(3)=PFI(IG5,IVTEMP)
226135     FRFDS(1)=1.0-FRFDS(2)-FRFDS(3)
226136     DO 60 IB=LOWCO,3
226137         TFDS(IB)=0.0
226138         DO 55 IFDS=1,3
226139             TFDS(IB)=TFDS(IB)+FRFDS(IFDS)*TTFD(IB,IP,IFDS)
226140     55 CONTINUE
226141         TCF(IB)=EXP(TFDS(IB)*TDIFF(IP))*TCF(IB)
226142     60 CONTINUE
226143         IF(LOWCO.EQ.1) RETURN
226144 C
226145 C   IVLDG additive low temperature CO offset with FDS differentiated.
226146 C
226147     COOFDS=0.0
226148     DO 65 IFDS=1,3
226149         COOFDS=COOFDS+FRFDS(IFDS)*COOTFD(IFDS)
226150     65 CONTINUE
226151     OFFCO(IDX,IVTEMP)=COOFDS*TDIFF(IP)*CHFRAC(1)
226152     RETURN
226153 C
226154 C   Low for all MY & high for RVP MYG 0 (pre-1985) TCF for HDGV.
226155 C
226156     70 IT=ITCPTR(MY,IP,IVTEMP)
226157     HDGTCF=EXP(TT4(MDLOHI(IP),IT,IP)*TDIFF(IP))
226158     DO 75 IB=1,3
226159         TCF(IB)=HDGTCF*TCF(IB)
226160     75 CONTINUE
226161     RETURN
226162 C
226163 C   Lo/hi TCF for MC.
226164 C
226165     80 IT=ITCPTR(MY,IP,IVTEMP)
226166     DO 85 IB=1,3
226167         TCF(IB)=EXP(TT8(MDLOHI(IP),IB,IT,IP)*TDIFF(IP))
226168     85 CONTINUE
226169 C
226170     RETURN
226171     END

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227000      SUBROUTINE BIGRVP(IP,IG,IFUEL,RVP1,RVP2)
227001      C
227002      C BIGRVP computes the combined temperature and RVP correction factor algorithm
227003      C used when the pollutant's temperature >= 75 degrees (FTP standard) and
227004      C the RVP cf alone when T < 75 degrees.
227005      C
227006      C See RVPEXH for an overall description of the RVP cf cases.
227007      C
227008      C Called by BIGTCF.
227009      C
227010      C Calls AMIN1 AND AMAX1.
227011      C
227012      C Input on call:
227013      C
227014      C   parameter list: IP,IG,IFUEL,RVP1,RVP2
227015      C   common blocks:
227016      C   /CITCIN/ ICERSW
227017      C   /CITRV2/ RVP090
227018      C   /RVPEX1/ RG23,TTL
227019      C   /RVPNAT/ ICERSY
227020      C   /TEMPC3/ MDLOHI
227021      C   /TEMPS/ TEMEXH,TEMAST
227022      C
227023      C Output on return:
227024      C
227025      C   common blocks:
227026      C   /TEMPC3/ TCFF
227027      C
227028      C Local variable dictionary:
227029      C
227030      C   Name      Type      Description
227031      C   -----
227032      C   CFB       R        RVP cf at begin point of temperature interpolation interval
227033      C   CFL       R        RVP cf at end point of temperature interpolation interval
227034      C   RDIFA     R        the larger of 0.0 and (applicable RVP - 9.0)
227035      C   REAT      R        RVP exhaust IP temperature adjusted for ASTM class
227036      C   REUT      R        RVP exhaust IP unadjusted temperature
227037      C   TDIFA     R        the larger of 0.0 & ((ASTM adjusted T capped at 95.0) - 75.0)
227038      C   TDIFU     R        (unadjusted (by ASTM) exhaust T capped at 95.0) - 75.0
227039      C
227040      C Notes:
227041      C
227042      C BIGRVP was added for MOBILE4.
227043      C
227044      C
227045      C   COMMON /CITCIN/ UDI(5),IUDI,CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW
227046      C   COMMON /CITRV2/ RVPHS1,RVPHS2,RVPET1,RVPET2,RVP090,RVP100,RVP115
227047      C   COMMON /RVPEX1/ R9G1(3,2),RG23(3,3,3,2),TLL(2)
227048      C   COMMON /RVPNAT/ ICERSY,RVPCER,RVPLIM(2),RVPDIU(2),PFUL,EINCR
227049      C   COMMON /TEMPC3/ MDLOHI(3),TDIFF(3),CHFRAC(3),TCFF(3,2),TCF(3)
227050      C   COMMON /TEMPS/ AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
227051      C
227052      C Reduce supplied RVPs to 11.7 for the RVP cf calculation only.
227053      C
227054      C   RVP1=AMIN1(RVP1,11.7)
227055      C   RVP2=AMIN1(RVP2,11.7)
227056      C
227057      C If RVP x T temp is .GT. 95 degrees, then reduce it to 95 for here only.

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227058 C If T term temp is .GT. 110 degrees, then reduce it to 110 for here only.
227059 C
227060 REAT=AMIN1(TEMAST(IP),95.0)
227061 TDIFA=REAT-75.0
227062 TDIFA=AMAX1(TDIFA,0.0)
227063 REUT=AMIN1(TEMEXH(IP),110.0)
227064 TDIFU=REUT-75.0
227065 C
227066 C Identify RVP to be used. If it is <= 9.0, combined RVP & T cf is 1.0.
227067 C
227068 RIVAL=RVP1
227069 IF(ICERSW.EQ.2.AND.MY.GE.ICERSY) RIVAL=RVP2
227070 RDIFA=RIVAL-RVPO90
227071 IF(TEMEXH(IP).GE.95.0) RDIFA=AMAX1(RDIFA,-2.0)
227072 IF(TEMEXH(IP).LT.95.0) RDIFA=AMAX1(RDIFA,0.0)
227073 C
227074 C Compute the cf for each bag.
227075 C
227076 IGR=IG-1
227077 C
227078 C Case 1: one equation produces a combined RVP & high/neutral T cf.
227079 C
227080 IF(MDLOHI(IP).EQ.1) GOTO 20
227081 C
227082 C Evaluate the combined RVP & high T cf formula.
227083 C
227084 DO 10 IB=1,3
227085 TCFF(IB,IFUEL)=RG23(1,IB,IP,IGR)*RDIFA+
227086 * RG23(2,IB,IP,IGR)*TDIFU+
227087 * RG23(3,IB,IP,IGR)*RDIFA*TDIFA
227088 TCFF(IB,IFUEL)=EXP(TCFF(IB,IFUEL))
227089 10 CONTINUE
227090 RETURN
227091 C
227092 C Case 2: interpolation produces a RVP cf for temperatures from 40-75 degrees.
227093 C
227094 C (a) First assign the endpoints at 40 and 75 degrees.
227095 C
227096 20 CFB=1.0
227097 DO 30 IB=1,3
227098 CFL=RG23(1,IB,IP,IGR)*RDIFA
227099 CFL=EXP(CFL)
227100 C
227101 C (b) Now interpolate between the 2 endpoints (CFB,CFL).
227102 C
227103 TCFF(IB,IFUEL)=CFB+(CFL-CFB)*(REAT-TLL(1))/TLL(2)
227104 C
227105 30 CONTINUE
227106 C
227107 RETURN
227108 END

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228000      SUBROUTINE BIGSAL(IP,IV,MY,IDX,ISP)
228001      C
228002      C BIGSAL computes SALHCF, the speed and, if LDGV/T or MC, optional adjustments
228003      C multiplicative correction factor table.
228004      C
228005      C Called by BIGCFX.
228006      C
228007      C Calls ISPPTR.
228008      C
228009      C Input on call:
228010      C
228011      C   parameter list: IP,IV,MY,IDX,ISP
228012      C   common blocks:
228013      C   /ALUOUT/ ALHRET
228014      C   /FLAGS2/ ALHFLG
228015      C   /SCENE1/ SPD
228016      C   /SPEED1/ SK1,SK2C,SKG,SK2N
228017      C   /SPEED3/ SADJ,SCUNA1
228018      C   /SPEED4/ LB1STS,IVA,IVB
228019      C   /SPEED5/ MYHSPC
228020      C   /SPEED7/ GPBSCO
228021      C
228022      C Output on return:
228023      C
228024      C   common blocks:
228025      C   /SPEED3/ SCADJ1,ISPGRP
228026      C   /SPEED6/ SALHCF
228027      C
228028      C Local variable / array dictionary:
228029      C
228030      C   Name      Type      Description
228031      C   -----
228032      C   A          R      coefficient "A" of new scf equation: A/X+B or EXP(A+BX+CX**2)
228033      C   B          R      coefficient "B" of new scf equation: A/X+B or EXP(A+BX+CX**2)
228034      C   C          R      coefficient "C" of new scf equation: EXP(A+BX+CX**2)
228035      C   SB         R      vehicle speed from SPD, given IV, for IVB scf calculation
228036      C   SCADJ2      R      new scf equation computed using opmode adjusted speed value
228037      C   SCF1        R      old scf equation computed using opmode adjusted speed value
228038      C   SCUNA2      R      new scf equation computed using unadjusted user inputted speed
228039      C   SPDGPB      R      accumulator: stores scf calculations for subgroup IVB
228040      C
228041      C Notes:
228042      C
228043      C BIGSAL was added for MOBILE4.
228044      C BIGSAL was modified in MOBILE4.
228045      C
228046      C
228047      C   INTEGER ALHFLG
228048      C
228049      C   COMMON /ALUOUT/ ALHRET(20,4,3)
228050      C   COMMON /FLAGS2/ MYMRF,NEWFLG,IMFLAG,ALHFLG
228051      C   COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
228052      C   COMMON /SPEED1/ SK1(6,18,3),SK2C(2,14,2,3),SKG(2,6,2),SK2N(3,14,3)
228053      C   COMMON /SPEED3/ SADJ,SCUNA1(18,3,8),SCADJ1(3,4),ISPGRP(3,4)
228054      C   COMMON /SPEED4/ MAXSP1,LB1STS(3),LBLAST,IVB,IVA
228055      C   COMMON /SPEED5/ MYHSPC(2,3),MAXHSP(3)
228056      C   COMMON /SPEED6/ SALHCF(20,3,8)
228057      C   COMMON /SPEED7/ GPBSCO(3,3,4)

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228058 C
228059 C Speed correction factor section
228060 C
228061 C     SALHCF (IDX,IP,IV)=1.0
228062 C     GOTO (20,20,20,10,10,10,10,20),IV
228063 C
228064 C SCF for IVB (Group B IV): HDGV, LDDV, LDDT, and HDDV.
228065 C Unless HDDV and NOX, exponentiate the 2nd degree polynomial result.
228066 C
228067 C 10 SB=SPD (IV)
228068 C     IF (IV.EQ.4.OR.IV.EQ.7)
228069 C     *     SPDGPB=GPBSCO (3,IP,IVB)*SB*SB
228070 C     *     +GPBSCO (2,IP,IVB)*SB
228071 C     *     +GPBSCO (1,IP,IVB)
228072 C     IF (IV.EQ.5.OR.IV.EQ.6)
228073 C     *     SPDGPB=GPBSCO (3,IP,IVB)*(SB*SB-SADJ*SADJ)
228074 C     *     +GPBSCO (2,IP,IVB)*(SB-SADJ)
228075 C     IF (IV.NE.4.OR.IP.NE.3) SPDGPB=EXP (SPDGPB)
228076 C     SALHCF (IDX,IP,IV)=SPDGPB
228077 C     RETURN
228078 C
228079 C SCF for LDGV, LDGT1, LDGT2 and MC.
228080 C
228081 C If optional corrections selected, correct LDGV, LDGT1, LDGT2 and MC
228082 C for air conditioning, extra load, trailer towing and/or humidity.
228083 C
228084 C 20 IF (ALHFLG.GT.1) SALHCF (IDX,IP,IV)=ALHRET (IDX,IVA,IP)
228085 C
228086 C Check if new LDG equation case:
228087 C Note: Split the IF, since at least 1 compiler chokes on LB1STS (8).
228088 C
228089 C     IF (IV.EQ.8) GOTO 30
228090 C     IF (MY.GE.LB1STS (IV)) GOTO 60
228091 C
228092 C Otherwise use old 5th degree polynomial equation.
228093 C
228094 C 30 IF (IV.EQ.8) ISP=ISPPTR (MY,IP,0,2)
228095 C
228096 C     IF (IDX.GT.1.AND.ISPGRP (IP,IVA).EQ.ISP) GOTO 50
228097 C
228098 C     SCF1=SK1 (6,ISP,IP)
228099 C     DO 40 ICOEF5=1,5
228100 C     SCF1=SCF1*SADJ+SK1 (6-ICOEF5,ISP,IP)
228101 C 40 CONTINUE
228102 C     IF (IP.NE.3) SCF1=EXP (SCF1)
228103 C     SCADJ1 (IP,IVA)=SCF1
228104 C     ISPGRP (IP,IVA)=ISP
228105 C
228106 C 50 SALHCF (IDX,IP,IV)=SALHCF (IDX,IP,IV)*
228107 C     1 (SCUNA1 (ISP,IP,IV)/SCADJ1 (IP,IVA))
228108 C     RETURN
228109 C
228110 C Select new equation form, based on pollutant, for LDG (LDGV, LDGT1, LDGT2).
228111 C
228112 C 60 IF (IP.EQ.3) GOTO 90
228113 C
228114 C New equation form for HC & CO is (A/X+B) / (A/Y+B), where X = inputted speed
228115 C and Y = operating mode adjusted FTP speed. (A,B) are selected from 1 of 2

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228116 C tables.
228117 C
228118 C Note: current high speed of my range begins at same point as new scf eq.
228119 C plus there is only 1 myg & B is 0.0. The original data was more
228120 C complex & may see a return, hence the original code is retained.
228121 C
228122 IF (SPD (IVA) .GT. 19.6 .AND. MY.GE.MYHSPC (1, IVA)) GOTO 70
228123 C
228124 C Use the first set of (A,B) coefficients.
228125 C
228126 ISP=ISPPTR (MY, IP, IVA, 3)
228127 A=SK2C (1, ISP, IP, IVA)
228128 B=SK2C (2, ISP, IP, IVA)
228129 GOTO 80
228130 C
228131 C Use second (speed GT FTP speed) set of (A,B) coefficients.
228132 C
228133 70 ISP=ISPPTR (MY, IP, IVA, 4)
228134 A=SKG (1, ISP, IP)
228135 B=SKG (2, ISP, IP)
228136 C
228137 80 SCUNA2= (A/SPD (IVA)) + B
228138 SCADJ2= (A/SADJ) + B
228139 SALHCF (IDX, IP, IVA) = SALHCF (IDX, IP, IVA) * (SCUNA2/SCADJ2)
228140 RETURN
228141 C
228142 C New equation form NOx is  $\text{EXP}(A+B*X+C*X**2) / \text{EXP}(A+B*Y+C*Y**2)$ , where X & Y
228143 C are defined as in the HC & CO case. There is only 1 (A,B) table for NOx.
228144 C
228145 90 ISP=ISPPTR (MY, IP, IVA, 3)
228146 A=SK2N (1, ISP, IVA)
228147 B=SK2N (2, ISP, IVA)
228148 C=SK2N (3, ISP, IVA)
228149 SCUNA2=EXP (A+B*SPD (IVA) + C*SPD (IVA) **2)
228150 SCADJ2=EXP (A+B*SADJ + C*SADJ **2)
228151 SALHCF (IDX, IP, IVA) = SALHCF (IDX, IP, IVA) * (SCUNA2/SCADJ2)
228152 C
228153 RETURN
228154 END

```



```

229000      SUBROUTINE BIGMET(IV,MY,IDX)
229001      C
229002      C BIGMET computes the additive methane offset to the composite HC emission
229003      C factor.
229004      C
229005      C Called by BIGCFX.
229006      C
229007      C Calls EXMPTR.
229008      C
229009      C Input on call:
229010      C
229011      C   parameter list: IV,MY,IDX
229012      C   common blocks:
229013      C   /NMETH1/ EXMET1,EXMET2
229014      C   /REGION/ IREJN
229015      C   /TEMPC3/ CHFRAC,TCF
229016      C
229017      C Output on return:
229018      C
229019      C   common blocks:
229020      C   /OFFSET/ OFFMTH
229021      C
229022      C Local variable / array dictionary:
229023      C
229024      C   Name      Type      Description
229025      C   -----
229026      C   OMT        R        unweighted product of operating mode vmt fraction times
229027      C                       temperature correction factor
229028      C
229029      C Notes:
229030      C
229031      C BIGMET was added for MOBILE4.
229032      C BIGMET was modified in MOBILE4 to map low altitude LDGV/T offsets into
229033      C high altitude values, when the 2nd (EXMET2) offset table applies.
229034      C
229035      C
229036      C   COMMON /NMETH1/ EXMET1(3,6,8,2),MYGEXM(6,8,2),EXMET2(3,10,3),LBEXM
229037      C   COMMON /NMETH2/ IEXMYG,IEXARR
229038      C   COMMON /OFFSET/ OFFCO(20,3),OFFMTH(20,8)
229039      C   COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
229040      C   COMMON /TEMPC3/ MDLOHI(3),TDIFF(3),CHFRAC(3),TCFF(3,2),TCF(3)
229041      C
229042      C   OFFMTH(IDX,IV)=0.0
229043      C   CALL EXMPTR(MY,IV)
229044      C   IF(IV.NE.4.AND.IV.NE.7) GOTO 10
229045      C
229046      C HDGV & HDDV: Straight table lookup - no adjustment for operating mode or
229047      C temperature or RVP. HDGV opmode is assumed 100% hot stabilized.
229048      C No actual bag split in data exists as for LDG, so for each
229049      C IEXMYG, the same methane fraction is stored for all 3 IB.
229050      C
229051      C   OFFMTH(IDX,IV)=EXMET1(2,IEXMYG,IV,IREJN)
229052      C   RETURN
229053      C
229054      C LDV/T and MC: Multiplicatively adjust for operating mode and temperature
229055      C by looping through the bag 1 - 3 cases.
229056      C
229057      C   10 DO 20 IB=1,3

```


Appendix C: MOBILE4 Subroutine BIGMET

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```
229058      OMT=CHFRAC (IB)*TCF (IB)
229059      IF (IEXARR.EQ.1)
229060      *      OFFMTH (IDX,IV)=OFFMTH (IDX,IV)+EXMET1 (IB,IEXMYG,IV,IREJN)*OMT
229061      IF (IEXARR.EQ.2)
229062      *      OFFMTH (IDX,IV)=OFFMTH (IDX,IV)+EXMET2 (IB,IEXMYG,IV)*OMT
229063      20 CONTINUE
229064      IF (IEXARR.EQ.2.AND.IREJN.EQ.2.AND.(IV.EQ.2.OR.IV.EQ.3))
229065      *      OFFMTH (IDX,IV)=1.25*OFFMTH (IDX,IV)
229066      C
229067      RETURN
229068      END
```

```

230000      SUBROUTINE BIGTAM(IP,IV,IDX)
230001      C
230002      C BIGTAM takes the additive tampering offset from TAMPER and corrects it for
230003      C operating mode and temperature.
230004      C
230005      C Called by BIGCFX.
230006      C
230007      C Calls none.
230008      C
230009      C Input on call:
230010      C
230011      C   parameter list: IP,IV,IDX
230012      C   common blocks:
230013      C   /TAMOUT/ TAMBAG
230014      C   /TEMPC3/ CHFRAC,TCF
230015      C
230016      C Output on return:
230017      C
230018      C   common blocks:
230019      C   /OMTCOM/ OMTTAM
230020      C
230021      C Local array subscripts:
230022      C
230023      C CHFHDG(3)          - CHFHDG ( IB )
230024      C
230025      C Local variable / array dictionary:
230026      C
230027      C   Name      Type      Description
230028      C   -----
230029      C CHFHDG    R      HDGV operating mode fractions (cold, hot stabilized and
230030      C                      hot start fractions of HDGV vmt, hardcoded)
230031      C OMT        R      unweighted product of operating mode vmt fraction times
230032      C                      temperature correction factor
230033      C TOMT       R      HDGV tampering offset adjusted for operating mode
230034      C
230035      C Notes:
230036      C
230037      C BIGTAM was added for MOBILE4.
230038      C
230039      C
230040      C   COMMON /OMTCOM/ OMTCF (20,3,8),OMTTAM(20,3,4)
230041      C   COMMON /TAMOUT/ TAMBAG (3,3,20,4),THS (2,20,4),TDU (20,4),TCC (20,4)
230042      C   COMMON /TEMPC3/ MDLOHI (3),TDIFF (3),CHFRAC (3),TCFF (3,2),TCF (3)
230043      C
230044      C   DIMENSION CHFHDG (3)
230045      C
230046      C   DATA CHFHDG/.206,.521,.273/
230047      C
230048      C HDGV: a special (ignoring user inputted scenario operating mode) opmode
230049      C correction to the TAMPER offset, the result then corrected by the "bag 2"
230050      C RVP & T cf (HDGV opmode for TCF is assumed 100% hot stabilized = bag 2).
230051      C
230052      C   IF (IV.NE.4) GOTO 20
230053      C   TOMT=0.0
230054      C   DO 10 IB=1,3
230055      C   TOMT=TOMT+CHFHDG (IB)*TAMBAG (IB,IP,IDX,IV)
230056      C 10 CONTINUE
230057      C   OMTTAM (IDX,IP,IV)=TOMT*TCF (2)

```

Appendix C: MOBILE4 Subroutine BIGTAM

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```
230058      RETURN
230059      C
230060      C LDV/T: TAMPER's offset is corrected by bag for both operating mode and
230061      C temperature.
230062      C
230063      C Note: multiplicative tcf for correcting tampering offset is neutral (1.0)
230064      C when LOWCO = 2 ( = cold start LDGV/T 1980/4+ CO -> use additive CO offset).
230065      C
230066      20 OMTTAM(IDX,IP,IV)=0.0
230067      DO 30 IB=1,3
230068      OMT=CHFRAC(IB)*TCF(IB)
230069      OMTTAM(IDX,IP,IV)=OMTTAM(IDX,IP,IV)+OMT*TAMBAG(IB,IP,IDX,IV)
230070      30 CONTINUE
230071      C
230072      RETURN
230073      END
```

```

231000      SUBROUTINE BIGOMT(IP,IV,IVLM,MY,IDX)
231001      C
231002      C   Compute bef's multiplicative correction for operating mode and temperature.
231003      C
231004      C   Called by BIGCFX.
231005      C
231006      C   Calls IBFPTR.
231007      C
231008      C   Input on call:
231009      C
231010      C       parameter list: IP,IV,IVLM,MY,IDX
231011      C       common blocks:
231012      C       /OPMOD1/ BFRCOF,BFSTEP,BFR50K
231013      C       /OPMOD2/ MYSTEP
231014      C       /OPMOD3/ BFMILE,KINKBF,BFGT50
231015      C       /TAMEQ1/ F50K
231016      C       /TEMPC3/ CHFRAC,TCF
231017      C       /TEMPC4/ LOWCO
231018      C
231019      C   Output on return:
231020      C
231021      C       common blocks:
231022      C       /OMTCOM/ OMTCF
231023      C
231024      C   Local variable / array dictionary:
231025      C
231026      C       Name      Type      Description
231027      C       -----
231028      C   COMT        R        working location for operating mode and temperature c.f. to
231029      C   DBF         R        BF deterioration rate for the first 50K miles
231030      C   D50        R        BF deterioration rate for beyond 50K miles
231031      C   FTPBF      R        FTP BF normalizing factor calculated at JDX x IV mileage
231032      C                        be multiplied times the base emission factor
231033      C   OMT         R        unweighted product of operating mode vmt fraction times
231034      C                        temperature correction factor
231035      C   ZBF         R        BF zero mile level
231036      C
231037      C   Notes:
231038      C
231039      C   BIGOMT was added for MOBILE4.
231040      C   BIGOMT was modified for MOBILE4, updating several common block declarations
231041      C   and adding 1984+ LDGT1/2 processing.
231042      C
231043      C
231044      C       COMMON /OMTCOM/ OMTCF (20,3,8),OMTTAM (20,3,4)
231045      C       COMMON /OPMOD1/ BFRCOF (8,8,3,6),BFSTEP (8,12,3,3),BFR50K (4,12,3)
231046      C       COMMON /OPMOD2/ MYSTEP,MAXBFR,MYGBFR (8,3,6)
231047      C       COMMON /OPMOD3/ BFMILE,KINKBF,BFGT50
231048      C       COMMON /TAMEQ1/ TAMZML (9,4,2,2),TAMDR (9,4,3,2),MYGTAM (4),IGT5,F50K
231049      C       COMMON /TEMPC3/ MDLOHI (3),TDIFF (3),CHFRAC (3),TCFF (3,2),TCF (3)
231050      C       COMMON /TEMPC4/ MYGCOO (3),LOWCO,COOTFC (3),COOTFD (3)
231051      C
231052      C   HDV: a single RVP & T cf - assume 100% hot stabilized opmode = TCF's bag 2
231053      C
231054      C       IF (IV.EQ.4.OR.IV.EQ.7) OMTCF (IDX,IP,IV)=TCF (2)
231055      C       IF (IV.EQ.4.OR.IV.EQ.7) RETURN
231056      C
231057      C   LDV/T and MC: bag loop generates the operating mode and temperature cf

```

Appendix C: MOBILE4 Subroutine BIGOMT

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```

231058 C using the appropriate RIPSTWXN bag term coefficients.
231059 C
231060 C Note: multiplicative tcf for correcting tampering offset is neutral (1.0)
231061 C when LOWCO = 2 ( = cold start LDGV/T 1980/4+ CO -> use additive CO offset).
231062 C So if cold start & low temp CO case, correct only for operating mode & RVP.
231063 C
231064 COMT=0.0
231065 IGLM=IBFPTR(MY,IP,IVLM)
231066 DO 40 IB=1,3
231067 OMT=CHFRAC(IB)
231068 OMT=OMT*TCF(IB)
231069 IF(MYSTEP.EQ.2) GOTO 10
231070 C
231071 C Not 1981+ LDGV and not 1984+ LDGT1/2 - access "old"
231072 C (from MOBILE2) array using myg index lookup.
231073 C
231074 ZBF=BFRCOF(2*IB-1,IGLM,IP,IVLM)
231075 DBF=BFRCOF(2*IB, IGLM,IP,IVLM)
231076 GOTO 20
231077 C
231078 C 1981+ LDGV or 1984+ LDGT1/2 - access its own
231079 C bf array using calculated my index.
231080 C
231081 10 ZBF=BFSTEP(2*IB-1,IGLM,IP,IVLM)
231082 DBF=BFSTEP(2*IB, IGLM,IP,IVLM)
231083 IF(KINKBF.EQ.2) GOTO 30
231084 C
231085 20 COMT=COMT+OMT*(ZBF+DBF*BFMILE)
231086 GOTO 40
231087 C
231088 C 1981+ LDGV with mileage > 50K - get >50K det rate using same MY index.
231089 C
231090 30 D50=BFR50K(IB,IGLM,IP)
231091 COMT=COMT+OMT*(ZBF+DBF*F50K+D50*BFGT50)
231092 C
231093 40 CONTINUE
231094 C
231095 C Normalize by dividing through by the formula evaluated at FTP coefficients.
231096 C
231097 C Case 1: not 1981+ LDGV and not 1984+ LDGT1/2
231098 C
231099 IF(MYSTEP.EQ.1) FTPBF=
231100 * BFRCOF(7,IGLM,IP,IVLM)+(BFRCOF(8,IGLM,IP,IVLM)*BFMILE)
231101 IF(MYSTEP.EQ.1) GOTO 50
231102 C
231103 C Case 2: Subcase 1: 1981+ LDGV <=50K miles and 1984+ LDGT1/2. (KINKBF=1)
231104 C Subcase 2: 1981+ LDGV > 50K miles. (KINKBF=2)
231105 C
231106 IF(KINKBF.EQ.1) FTPBF=BFSTEP(7,IGLM,IP,IVLM)+
231107 * (BFSTEP(8,IGLM,IP,IVLM)*BFMILE)
231108 IF(KINKBF.EQ.2) FTPBF=BFSTEP(7,IGLM,IP,IVLM)+
231109 * (BFSTEP(8,IGLM,IP,IVLM)*F50K)+(BFR50K(4,IGLM,IP)*BFGT50)
231110 C
231111 50 OMTCF(IDX,IP,IV)=COMT/FTPBF
231112 C
231113 RETURN
231114 END

```



```

232000      SUBROUTINE HCCALX(ICY,VMLDGT,INERR)
232001      C
232002      C HCCALX calculates HC emission factors.
232003      C
232004      C Called by EFCALX.
232005      C
232006      C Calls BEF, CCEVRT, IGSFPT, QUITER, RULOSS and IEVPTR.
232007      C
232008      C Input on call:
232009      C
232010      C   parameter list: ICY,VMLDGT,INERR
232011      C   common blocks:
232012      C   /CITCIN/ CIGAS1,CIGAS2,CIETH1,CIETH2
232013      C   /CITPAR/ FRETH,FRMETH,FRGAS
232014      C   /CITRV2/ RVPHS1,RVPHS2,RVPET1,RVPET2
232015      C   /CUMCOM/ CUMMIL
232016      C   /EGSCAL/ OPENLP
232017      C   /FLAGS3/ RLFLAG
232018      C   /GSFCOM/ GSFRAC
232019      C   /MAXIMA/ MAXVEH,MAXYRS
232020      C   /MYRCAL/ JANMYR,TF
232021      C   /REGION/ IREJN
232022      C   /RLCOM3/ RLRATE
232023      C   /RVPEX2/ OPENCR
232024      C   /VMXCOM/ REGMIX,VMTMIX
232025      C
232026      C Output on return:
232027      C
232028      C   parameter list: INERR
232029      C   common blocks:
232030      C   /RESUL1/ EFFTP,EFEXH,EFEVAP,EFLOSS
232031      C   /RESUL3/ VFTP,VEXH,VEVAP,VLOSS,VRUNLS
232032      C   /EVAPGR/ EVP,GREVP,VGREVP
232033      C
232034      C Local array subscripts
232035      C
232036      C EVPSUM ( 4 ) - EVPSUM ( IEVP )
232037      C
232038      C Local variable / array dictionary:
232039      C
232040      C   Name      Type      Description
232041      C   -----
232042      C   COMPCC    R      composite evaporative & crankcase emission factor for IDX
232043      C   COMPEF    R      composite emission factor for IDX: summed across IDX to get
232044      C                      EFFTP for the given IP & IV
232045      C   EVPSUM     R      gram evap component summation variable
232046      C   EXHHC      R      exhaust HC component of total HC, for given IV x IDX case
232047      C   EXHWGT     R      multiplicative weights to be applied to the exh ef returned
232048      C                      by BEF: speed & "BIGALH" cf, travel fraction & RVP cf
232049      C   GASCAP     R      refueling HC loss factor for given IDX and IV
232050      C   IBEFSW     I      see parameter dictionary
232051      C   OPENRE     R      open loop technology percentage reduction of HC & CO for a
232052      C   RVOPCF     R      exhaust HC & CO cf for RVP and open loop technology, IV=1,4
232053      C                      given vehicle type and model year
232054      C   VMTAGE     R      see parameter dictionary
232055      C
232056      C Notes:
232057      C

```

Appendix C: MOBILE4 Subroutine HCCALX

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```

232058 C HCCALX was added for MOBILE4 and modified in 4.4 to remove idle code.
232059 C HCCALX was modified in MOBILE4.
232060 C
232061 C
232062 CHARACTER*4 SCNAME
232063 INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
232064 REAL JANMYR
232065 C
232066 COMMON /CITCIN/ UDI (5),IUDI,CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW
232067 COMMON /CITPAR/ SCNAME (4),FRETH,FRMETH,FRGAS
232068 COMMON /CITRV1/ RVPBAS,RVPIUS,RVPAST,RVPICY,RVPETH,IUSESY,RATUNC
232069 COMMON /CITRV2/ RVPHS1,RVPHS2,RVPET1,RVPET2,RVPO90,RVP100,RVP115
232070 COMMON /CUMCOM/ CUMMIL (20,8)
232071 COMMON /EGSCAL/ AER (11,11,2,2),TGS (11,6,4),EGS (7,2),OPENLP (20,4)
232072 COMMON /EVAPGR/ EVP (4),GREVP (4,9),VGREVP (4)
232073 COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
232074 COMMON /GSFCOM/ MAXGSF,GSFRAC (22,8,2),MYGSF (22,8,2)
232075 COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
232076 COMMON /MYRCAL/ XMYM (20,8),JANMYR (20,8),TF (20,8),TFMYM (20,8)
232077 COMMON /RLCOM3/ RLRATE (20,4)
232078 COMMON /REGION/ FEET (2),IREJN,ALT,INITPR
232079 COMMON /RESUL1/ EFFTP (3,9),EFEXH (9),EFEVAP (9),EFLOSS (9),EFRUNL (9)
232080 COMMON /RESUL3/ VFTP (3),VEXH,VEVAP,VLOSS,VRUNLS,VIDLE (3)
232081 COMMON /RVPEX2/ MYGRVP (4,4),RVPCF (20,3,4,2),OPENCR
232082 COMMON /SPEED6/ SALHCF (20,3,8)
232083 COMMON /VMXCOM/ REGMIX (8),TFNORM (8),VMTMIX (8)
232084 C
232085 DIMENSION EVPSUM (4)
232086 C
232087 C Initialize
232088 C
232089 EFEXH (9)=0.0
232090 EFEVAP (9)=0.0
232091 EFLOSS (9)=0.0
232092 EFRUNL (9)=0.0
232093 VEXH=0.0
232094 VEVAP=0.0
232095 VLOSS=0.0
232096 VRUNLS=0.0
232097 DO 10 IEVP=1,4
232098 GREVP (IEVP,9)=0.0
232099 VGREVP (IEVP)=0.0
232100 10 CONTINUE
232101 C
232102 IP=1
232103 EFFTP (IP,9)=0.0
232104 VFTP (IP)=0.0
232105 C
232106 C For each vehicle class, calculate exhaust, evap and loss values
232107 C
232108 DO 70 IV=1,MAXVEH
232109 EFFTP (IP,IV)=0.0
232110 EFEXH (IV)=0.0
232111 EFEVAP (IV)=0.0
232112 EFLOSS (IV)=0.0
232113 EFRUNL (IV)=0.0
232114 DO 15 IEVP=1,4
232115 GREVP (IEVP,IV)=0.0

```

```

232116      15 CONTINUE
232117      C
232118      IF (REGMIX(IV).EQ.0.0.AND.VMTMIX(IV).EQ.0.0) GOTO 70
232119      C
232120      DO 55 IDX=1,MAXYRS
232121      JDX=21-IDX
232122      C
232123      IF (TF (IDX,IV).LE.0.0.AND.JANMYR(JDX,IV).EQ.0.0) GOTO 55
232124      C
232125      COMPEF=0.0
232126      EXHHC=0.0
232127      COMPPC=0.0
232128      GASCAP=0.0
232129      RNGLOS=0.0
232130      C
232131      DO 20 IEVP=1,4
232132      EVPSUM(IEVP)=0.0
232133      20 CONTINUE
232134      C
232135      VMTAGE=CUMMIL(JDX,IV)/10000.
232136      MY=ICY+IDX-20
232137      IGS=IGSFPT(MY,IV)
232138      C
232139      C Combine the speed and aluh correction factor and the travel fraction
232140      C into a single weight to correct the exhaust ef returned from BEF.
232141      C
232142      EXHWGT=SALHCF(IDX,IP,IV)*TF(IDX,IV)
232143      C
232144      C Apply the exhaust weight to the BEF's computed ef.
232145      C IBEFSW is set to 2 so that BEF performs the operating mode corrections.
232146      C
232147      IBEFSW=2
232148      EXHHC=BEF(MY,IDX,ICY,IP,IV,VMTAGE,IBEFSW)*EXHWGT
232149      C
232150      C Exhaust HC ef is complete for diesels.
232151      C
232152      IF (IV.GE.5.AND.IV.LE.7) GOTO 25
232153      C
232154      C Motorcycles have no RVP exhaust cf, but do get open loop technology credit.
232155      C
232156      IF (IV.EQ.8)
232157      *   EXHHC=EXHHC*(FRGAS+(FRETH+FRMETH)*(1.0-OPENCR))
232158      IF (IV.EQ.8) GOTO 25
232159      C
232160      C For LDGV/T or HDGV, calculate and apply HC RVP exhaust and technology
232161      C correction factor.
232162      C
232163      OPENRE=1.0-OPENLP(IDX,IV)*OPENCR
232164      RVOPCF=FRGAS*RVPCF(IDX,IP,IV,1)
232165      *   +(FRETH*RVPCF(IDX,IP,IV,2)
232166      *   +FRMETH*RVPCF(IDX,IP,IV,1))*OPENRE
232167      EXHHC=EXHHC*RVOPCF
232168      25 EFEXH(IV)=EFEXH(IV)+EXHHC
232169      COMPEF=COMPEF+EXHHC
232170      C
232171      C Now figure composite evaporative and crankcase factor for
232172      C current my, including any onboard effect. Diesels (IV=5-7) do not have
232173      C evaporative, on-board or RVP components, so branch accordingly.

```

```

232174 C
232175 IF (IV.GE.5.AND.IV.LE.7) GOTO 50
232176 COMPCC=CCEVRT (MY,IDX,IV,RVPHS1,RVPHS2,CIGAS1,CIGAS2)
232177 C
232178 C Call to CCEVRT also computes gram evap components.
232179 C Weight gram evap components by ethanol fraction.
232180 C Crankcase evap is not fuel type dependent.
232181 C
232182 DO 30 IEVP=1,3
232183 EVPSUM (IEVP)=EVP (IEVP)*(1.0-FRETH)
232184 30 CONTINUE
232185 C
232186 EVPSUM (4)=EVP (4)
232187 C
232188 C Calculate running loss emissions for gas fueled vehicles.
232189 C Motorcycles do not have running loss emissions.
232190 C
232191 IF (IV.LE.4) RNGLOS=RULOSS (MY,IDX,IV,RVPHS1,RVPHS2)*(1.0-FRETH)
232192 C
232193 C Done with evap, unless ethanol fraction is positive, in which case first
232194 C have to compute and average in the base evaporative and crankcase factor
232195 C using ethanol fuel. Do likewise for ethanol portion of gram evap.
232196 C Crankcase evap is not fuel type dependent.
232197 C
232198 IF (FRETH.EQ.0.0) GOTO 40
232199 C
232200 COMPCC=(1.0-FRETH)*COMPCC
232201 * +FRETH*CCEVRT (MY,IDX,IV,RVPET1,RVPET2,CIETH1,CIETH2)
232202 C
232203 DO 35 IEVP=1,3
232204 EVPSUM (IEVP)=EVPSUM (IEVP)+EVP (IEVP)*FRETH
232205 35 CONTINUE
232206 C
232207 C Combine running losses from gas fueled with ethanol fueled vehicles
232208 C Motorcycles do not have running loss emissions.
232209 C
232210 IF (IV.LE.4) RNGLOS=RNGLOS+RULOSS (MY,IDX,IV,RVPET1,RVPET2)*FRETH
232211 C
232212 C Weight by travel or registration fractions and summate.
232213 C
232214 40 COMPCC=COMPCC*TF (IDX,IV)
232215 EFEVAP (IV)=EFEVAP (IV)+COMPCC
232216 COMPEF=COMPEF+COMPCC
232217 C
232218 RNGLOS=RNGLOS*TF (IDX,IV)
232219 EFRUNL (IV)=EFRUNL (IV)+RNGLOS
232220 COMPEF=COMPEF+RNGLOS
232221 C
232222 DO 45 IEVP=1,4
232223 EVPSUM (IEVP)=EVPSUM (IEVP)*JANMYR (JDX,IV)
232224 GREVP (IEVP,IV)=GREVP (IEVP,IV)+EVPSUM (IEVP)
232225 45 CONTINUE
232226 C
232227 C Refueling losses (GASCAP) only occur for gasoline vehicles (IV = 1-4)
232228 C under one of the nonzero refueling loss options (RLFLAG = 1-4).
232229 C
232230 IF (IV.GT.4.OR.RLFLAG.EQ.5) GOTO 50
232231 GASCAP=RLRATE (IDX,IV)*TF (IDX,IV)

```


Appendix C: MOBILE4 Subroutine HCCALX

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```

232232      EFLOSS (IV)=EFLOSS (IV)+GASCAP
232233      COMPEF=COMPEF+GASCAP
232234      C
232235      C Update FTP composite HC.
232236      C
232237      50 EFFTP (IP,IV)=EFFTP (IP,IV)+COMPEF
232238      55 CONTINUE
232239      C
232240      C Sales fractions = 1.0 for all 4 HDV (HDG,HDD x L,H alt) groups and all MC's.
232241      C
232242      IF (IV.EQ.4.OR.IV.GE.7) GOTO 60
232243      IF (EFFTP (IP,IV).GT.0.0.AND.GSFRAC (IGS,IV,IREJN).EQ.0.0)
232244      * CALL QUITER (0.,IV,67,INERR)
232245      60 IF (EFFTP (IP,IV).LE.0.0) CALL QUITER (0.,IV,68,INERR)
232246      C
232247      C Weight by VMTMIX for mileage components and REGMIX for gram components.
232248      C
232249      VFTP (IP)=VFTP (IP)+EFFTP (IP,IV)*VMTMIX (IV)
232250      VEXH=VEXH+EFEXH (IV)*VMTMIX (IV)
232251      VEAP=VEAP+EFEVAP (IV)*VMTMIX (IV)
232252      VLOSS=VLOSS+EFLOSS (IV)*VMTMIX (IV)
232253      VRUNLS=VRUNLS+EFRUNL (IV)*VMTMIX (IV)
232254      C
232255      DO 65 IEVP=1,3
232256      VGREVP (IEVP)=VGREVP (IEVP)+GREVP (IEVP,IV)*REGMIX (IV)
232257      65 CONTINUE
232258      VGREVP (4)=VGREVP (4)+GREVP (4,IV)*VMTMIX (IV)
232259      70 CONTINUE
232260      C
232261      C Assign composite light duty gas truck emission factors.
232262      C
232263      IF (EFFTP (IP,2).GT.0.0.AND.EFFTP (IP,3).GT.0.0) EFFTP (IP,9)=
232264      * (EFFTP (IP,2)*VMTMIX (2)+EFFTP (IP,3)*VMTMIX (3))/VMLDGT
232265      IF (EFEXH (2).GT.0.0.AND.EFEXH (3).GT.0.0)
232266      * EFEXH (9)=(EFEXH (2)*VMTMIX (2)+EFEXH (3)*VMTMIX (3))/VMLDGT
232267      IF (EFEVAP (2).GT.0.0.AND.EFEVAP (3).GT.0.0)
232268      * EFEVAP (9)=(EFEVAP (2)*VMTMIX (2)+EFEVAP (3)*VMTMIX (3))/VMLDGT
232269      IF (EFLOSS (2).GT.0.0.AND.EFLOSS (3).GT.0.0)
232270      * EFLOSS (9)=(EFLOSS (2)*VMTMIX (2)+EFLOSS (3)*VMTMIX (3))/VMLDGT
232271      IF (EFRUNL (2).GT.0.0.AND.EFRUNL (3).GT.0.0)
232272      * EFRUNL (9)=(EFRUNL (2)*VMTMIX (2)+EFRUNL (3)*VMTMIX (3))/VMLDGT
232273      C
232274      DO 75 IEVP=1,3
232275      IF (GREVP (IEVP,2).GT.0.0.AND.GREVP (IEVP,3).GT.0.0)
232276      * GREVP (IEVP,9)=(GREVP (IEVP,2)*REGMIX (2)
232277      * +GREVP (IEVP,3)*REGMIX (3))
232278      * / (REGMIX (2)+REGMIX (3))
232279      75 CONTINUE
232280      IF (GREVP (4,2).GT.0.0.AND.GREVP (4,3).GT.0.0)
232281      * GREVP (4,9)=(GREVP (4,2)*VMTMIX (2)
232282      * +GREVP (4,3)*VMTMIX (3))
232283      * /VMLDGT
232284      C
232285      RETURN
232286      END

```


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```

233000      FUNCTION CCEVRT(MY,IDX,IV,RV1,RV2,C11,C12)
233001      C
233002      C CCEVRT is a REAL-valued function that returns a hydrocarbon combined
233003      C evaporative (hot soak + diurnal) and crankcase emission factor. The
233004      C hot soak value is weighted by trips per day and the evaporative sum is
233005      C weighted by miles per day.
233006      C
233007      C Called by HCCALX.
233008      C
233009      C Calls CRANKC, DIURNL, HOTSOK, and IEVPTR.
233010      C
233011      C Input on call:
233012      C
233013      C   parameter list: MY,IDX,IV,RV1,RV2,C11,C12
233014      C   common blocks:
233015      C   /CEVBMV/ BMYMPD,BMYTPD
233016      C   /CITCIN/ ICERSW
233017      C   /INJECT/ TBI,PFI
233018      C   /RVPNAT/ ICERSY
233019      C   /TAMOUT/ TCC
233020      C   /VMXCOM/ TFNORM
233021      C
233022      C Output on return:
233023      C
233024      C   common blocks:
233025      C   /EVAPAR/ IFDS,ISTDC,ISTDT,ISTDP,FINJ (to IEVPTR, HOTSOK, DIURNAL)
233026      C   /CITUSE/ RVUSE1,RVUSE2,C1USE1,C1USE2 (to HOTSOK & DIURNL)
233027      C   function: CCEVRT
233028      C
233029      C Local variable dictionary:
233030      C
233031      C   Name      Type      Description
233032      C   -----
233033      C   CC        R        crankcase HC effect = CRANKC + tampering cc offset, if any
233034      C   DI        R        diurnal HC effect = DIURNL + tampering di offset, if any
233035      C   HS        R        hot soak HC effect = HOTSOK + tampering hs offset, if any
233036      C   IG5        I        pointer to fuel injected sales percentage for given my
233037      C   IVGAS      I        see (1,999)'s subscript dictionary
233038      C   KEYEQ      I        see (1,999)'s subroutine / function dictionary
233039      C   MPD        R        miles per day
233040      C
233041      C Notes:
233042      C
233043      C Hot soak, diurnal and crankcase without tampering and with tampering HC are
233044      C figured separately and then added together, according to Evap Study 2.
233045      C The additions are done before miles per day and trips per day are applied
233046      C as weights.
233047      C
233048      C CCEVRT was modified in MOBILE4, with separate TBI and PBI calculations.
233049      C
233050      C
233051      C   INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
233052      C   REAL MPD
233053      C
233054      C   COMMON /CEVBMV/ BMYMPD(20,8),BMYTPD(20,8)
233055      C   COMMON /CITCIN/ UDI(5),IUDI,CIGAS1,CIGAS2,C1ETH1,C1ETH2,ICERSW
233056      C   COMMON /CITUSE/ RVUSE1,RVUSE2,C1USE1,C1USE2
233057      C   COMMON /EVAPAR/ IFDS,ISTDC,ISTDT,ISTDP,FINJ(2)

```

Appendix C: MOBILE4 Function CCEVRT

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```

233058      COMMON /EVAPGR/  EVP (4),GREVP (4,9),VGREVP (4)
233059      COMMON /FLAGS3/  ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
233060      COMMON /INJECT/  TBI (13,4),PFI (13,4),MAXFIY,MINFIY
233061      COMMON /RVPNAT/  ICERSY,RVPCER,RVPLIM (2),RVPDIU (2),PFUL,EINCR
233062      COMMON /TAMOUT/  TAMBAG (3,3,20,4),THS (2,20,4),TDU (20,4),TCC (20,4)
233063      COMMON /TPDCOM/  TPDCO (2,8)
233064      COMMON /VMXCOM/  REGMIX (8),TFNORM (8),VMTMIX (8)
233065      C
233066      C Set parameters that are identical for hotsoak and diurnal calculations.
233067      C
233068          IVGAS=IV
233069          IF (IV.EQ.8) IVGAS=5
233070      C
233071          KEYEQ=1
233072          IF (IV.LE.4.AND.ICERSW.EQ.2.AND.ICERSY.LE.MY) KEYEQ=3
233073      C
233074      C Determine basic miles per day according to vehicle class.
233075      C
233076          JDX=21-IDX
233077      C
233078          IF (IVGAS.LE.3) MPD=BMYPMD (JDX,IV)
233079          IF (IVGAS.GE.4) MPD=TFNORM (IV)*100000./365.0
233080      C
233081      C Warn if MPD is zero.
233082      C
233083          IF (MPD.EQ.0.0) CALL QUITER (FLOAT (MY),IV,58,INERR)
233084      C
233085      C Obtain the untampered evap & crankcase emissions.
233086      C
233087      C Reassign the parameter list RVP variables to their corresponding /CITRV3/
233088      C variables. The latter can not simply be placed in the parameter list.
233089      C The function arg list transfer is done by "call by address". If a common
233090      C block variable appeared in the parameter list, a conflict would occur
233091      C between the (compile time determined) common block address and the
233092      C calling routine's address for the arg list variable being "passed".
233093      C
233094          RVUSE1=RV1
233095          RVUSE2=RV2
233096          CIUSE1=C11
233097          CIUSE2=C12
233098      C
233099      C Look up HS/DU model year group pointers:
233100      C
233101      C (1) 1 emission standard code for each fuel delivery system (IFDS) -
233102      C       1 = carbureted (ISTDC)
233103      C       2 = TBI (ISTDT)
233104      C       3 = PFI (ISTDP)
233105      C
233106      C (2) 1 for the percentage of vehicle type's fleet that is TBI (FINJ(1))
233107      C       and PFI (FINJ(2)). (IG5 dimension of TBI and PFI
233108      C       (IG5 dimension of TBI and PFI)).
233109      C
233110      C Carb
233111          IFDS=1
233112          ISTDC=IEVPTR (MY,KEYEQ,IVGAS,1)
233113      C
233114          IF (IVGAS.GE.4.OR.MY.LT.1981) GOTO 10
233115      C

```

```

233116 C TBI
233117     IFDS=2
233118     ISTD=IEVPTR(MY,KEYEQ,IVGAS,1)
233119 C
233120     IG5=IEVPTR(MY,0,IVGAS,2)
233121     FINJ(1)=TBI(IG5,IVGAS)
233122 C
233123 C PFI
233124     IFDS=3
233125     ISTD=IEVPTR(MY,KEYEQ,IVGAS,1)
233126 C
233127     IG5=IEVPTR(MY,0,IVGAS,2)
233128     FINJ(2)=PFI(IG5,IVGAS)
233129 C
233130 C Call functions to calculate hot soak and diurnal and lookup crankcase
233131 C rates. The first two are returned with the tampering offset already
233132 C added in, given LDGV/T or HDGV. Hot soak and crank case are zero when
233133 C MPD is zero. Diurnals occur regardless of MPD.
233134 C
233135     10 HS=0.0
233136     EVP(1)=0.0
233137     IF(MPD.GT.0.0) HS=HOTSOK(MY,IDX,KEYEQ,IVGAS)
233138 C
233139     EVP(2)=0.0
233140     EVP(3)=0.0
233141     DU=DIURNL(MY,IDX,KEYEQ,IVGAS)
233142 C
233143     CC=0.0
233144     IF(MPD.GT.0.0) CC=CRANKC(MY,IV)
233145 C
233146 C GV/T => tampering crankcase HC effects are to be added.
233147 C
233148     IF(IVGAS.LE.4.AND.MPD.GT.0.0) CC=CC+TCC(IDX,IV)
233149     EVP(4)=CC
233150 C
233151 C CCEVRT is also zero if MPD is zero.
233152 C
233153     CCEVRT=0.0
233154     IF(MPD.EQ.0.0) GOTO 90
233155 C
233156 C Combining the 3 factors requires converting hotsoak from grams per trip to
233157 C grams per day (gpd), adding in diurnal (which by definition only occurs once
233158 C per day), converting the sum from gpd to grams per mile (gpm), and, finally,
233159 C adding in crankcase (which is already in gpm).
233160 C
233161     CCEVRT=(HS*BMYPD(JDX,IV)+DU)/MPD+CC
233162 C
233163     90 RETURN
233164     END

```

Appendix C: MOBILE4 Function HOTSOK

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```

234000      FUNCTION HOTSOK (MY,IDX,KEYEQ,IVGAS)
234001      C
234002      C HOTSOK selects the yearly value for hot soak HC.
234003      C
234004      C Called by CCEVRT.
234005      C
234006      C Calls EVMAIN, QUITER.
234007      C
234008      C Input on call:
234009      C
234010      C   parameter list: MY,IDX,KEYEQ,IVGAS
234011      C   common blocks:
234012      C   /CITUSE/ RVUSE1,RVUSE2
234013      C   /EVAHS1/ HSEQ
234014      C   /EVAPAR/ ISTDC,ISTDT,ISTDP,FINJ
234015      C   /EVAPHD/ IVVMAP
234016      C   /FLAGS3/ TEMFLG
234017      C   /TAMOUT/ THS
234018      C   /TEMPS/ AMBT,TEMMIN,TEMMAX,TEMEVP
234019      C
234020      C Output on return:
234021      C
234022      C   function: HOTSOK
234023      C   /EVAPGR/ EVP
234024      C
234025      C Local array subscripts
234026      C
234027      C HSINJ (2) - HSINJ (2)
234028      C HSTCF (3) - HSTCF (IFDS)
234029      C
234030      C Local variable / array dictionary
234031      C
234032      C   Name      Type      Description
234033      C   -----
234034      C HSCAR      R      hot soak loss for carbureted vehicles
234035      C HSCCAR     R      hot soak loss for controlled/untampered carbureted vehicles
234036      C HSCINJ     R      hot soak loss for controlled/untampered fuel injected vehicles
234037      C HSINJ      R      hot soak loss for fuel injected vehicles, index is
234038      C                      1=TBI, 2=PBI
234039      C HSTCF      R      hot soak temperature correction factor for CARB, TBI,
234040      C                      and PBI
234041      C HSTEMP     R      temperature used in the hot soak temperature correction
234042      C                      factor equation
234043      C HSUCAR      R      hot soak loss for uncontrolled/tampered carbureted vehicles
234044      C HSUINJ     R      hot soak loss for uncontrolled/tampered fuel injected vehicles
234045      C IVV        I      vehicle (IVV=1) or truck (IVV=2) classification switch
234046      C RVPHS      R      hot soak RVP adjusted for weathering
234047      C FULADJ     R      FTP vs In-Use fuel level adjustment factor for fuel
234048      C                      injected vehicles
234049      C TRIPFR      R      fraction of vehicle fleet with daily trips
234050      C
234051      C Notes:
234052      C
234053      C HOTSOK was modified for MOBILE4. Hot Soak = 0 when Hot Soak temp <= 40F,
234054      C separate TBI and PFI calculations, hot soak temperature correction
234055      C added.
234056      C
234057      C

```


Appendix C: MOBILE4 Function HOTSOK

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```

234058      COMMON /CITUSE/ RVUSE1,RVUSE2,CIUUSE1,CIUUSE2
234059      COMMON /EVAHS1/ HSEQ (3,2,12),EFHS (4,2),HDHS (2),CLHS (5,2)
234060      COMMON /EVAPGR/ EVP (4),GREVP (4,9),VGREVP (4)
234061      COMMON /EVAPAR/ IFDS,ISTDC,ISTDT,ISTDP,FINJ (2)
234062      COMMON /EVAPHD/ HDSAL,HDWGT (2),IVVMAP (5)
234063      COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
234064      COMMON /TAMOUT/ TAMBAG (3,3,20,4),THS (2,20,4),TDU (20,4),TCC (20,4)
234065      COMMON /TEMPS/ AMBT,TEMMIN,TEMMA,TEMEXH (3),TEMEVP (6),TEMAST (3)
234066      C
234067      DIMENSION HSINJ (2),HSTCF (3)
234068      DATA FULADJ/0.88/
234069      C
234070      C Hot soak is zero if any evaporative temperature is 40F or less,
234071      C or if minimum temperature is 25F or less.
234072      C
234073      HOTSOK=0.0
234074      EVP (1)=0.0
234075      IF (TEMMA .LE.40.0 .OR.
234076      *   AMBT .LE.40.0.AND.TEMFLG.EQ.2 .OR.
234077      *   TEMEVP (1).LE.40.0 .OR.
234078      *   TEMEVP (2).LE.40.0 .OR.
234079      *   TEMMIN .LE.25.0) RETURN
234080      C
234081      KEYEVP=1
234082      C
234083      C Choice of RVP depends on whether or not cert fuel change applies to the
234084      C current MY.
234085      C
234086      RVPHS=RVUSE1
234087      C
234088      IF (KEYEQ.EQ.1) RIVAL=RVUSE1
234089      IF (KEYEQ.EQ.3) RIVAL=RVUSE2
234090      C
234091      C Lower bound on Hot Soak RVP is 8.0, reset if necessary.
234092      C
234093      IF (RVPHS.LT.8.0) RVPHS=8.0
234094      IF (RIVAL.LT.8.0) RIVAL=8.0
234095      C
234096      C Compute the Hot Soak Temperature Correction Factor for each fuel
234097      C delivery system.
234098      C
234099      IVV=IVVMAP (IVGAS)
234100      C
234101      DO 20 IFDS=1,3
234102      C
234103      C Select the base temperature to be used for the hot soak correction
234104      C factor. Use the calculated hot soak temperature as default. However,
234105      C if that temperature is below 70F for 1981+ CARB/TBI LDGVs or
234106      C 1981+ TBI LDGTs or MCs, use 70F instead.
234107      C
234108      HSTEMP=TEMEVP (1)
234109      IF (IVGAS.EQ.4.OR.HSTEMP.GE.70.0) GOTO 10
234110      5 IF ((IVGAS.EQ.1.AND.IFDS.LE.2).OR.
234111      *   (IVGAS.GE.2.AND.IVGAS.LE.3.AND.IFDS.EQ.2).OR.
234112      *   IVGAS.EQ.5)
234113      *   HSTEMP=70.0
234114      C
234115      10 HSTCF (IFDS)=(HSEQ (IFDS,IVV, 9)

```



```

234116      *      +HSEQ(IFDS,IVV,10)*HSTEMP
234117      *      +HSEQ(IFDS,IVV,11)*HSTEMP**2)
234118      *      /HSEQ(IFDS,IVV,12)
234119      C
234120      20 CONTINUE
234121      C
234122      C Compute and combine the controlled and uncontrolled rates for carbureted
234123      C and fuel-injected vehicles.
234124      C
234125      C Motorcycles in MOBILE4 are 100% carbureted and not affected by tampering.
234126      C
234127      HSINJ(1)=0.0
234128      HSINJ(2)=0.0
234129      C
234130      IF (IVGAS.EQ.5)
234131      *      CALL EVMAIN(MY,KEYEVP,KEYEQ,IVGAS,ISTDC,RIVAL,HSCAR)
234132      IF (IVGAS.EQ.5) GOTO 30
234133      C
234134      C All HDGV and pre-1981 LDGV/T are 100% carbureted, but are affected by
234135      C tampering. For these vehicle classes, figure a carbureted number
234136      C accordingly and then skip the fuel injected rate case.
234137      C
234138      CALL EVMAIN(MY,KEYEVP,KEYEQ,IVGAS,ISTDC,RIVAL,HSCCAR)
234139      CALL EVMAIN(MY,KEYEVP, 2,IVGAS,ISTDC,RVPHS,HSUCAR)
234140      HSCAR=HSCCAR+(HSUCAR-HSCCAR)*THS(1,IDX,IVGAS)
234141      IF (IVGAS.EQ.4.OR.MY.LT.1981) GOTO 30
234142      C
234143      C If LDGV/T and 1981+, calculate the fuel injected (TBI and PBI)
234144      C vehicle hot soak rates.
234145      C
234146      CALL EVMAIN(MY,KEYEVP,KEYEQ,IVGAS,ISTDT,RIVAL,HSCINJ)
234147      CALL EVMAIN(MY,KEYEVP, 2,IVGAS,ISTDT,RVPHS,HSUINJ)
234148      HSINJ(1)=HSCINJ+(HSUINJ-HSCINJ)*THS(2,IDX,IVGAS)
234149      C
234150      CALL EVMAIN(MY,KEYEVP,KEYEQ,IVGAS,ISTDP,RIVAL,HSCINJ)
234151      CALL EVMAIN(MY,KEYEVP, 2,IVGAS,ISTDP,RVPHS,HSUINJ)
234152      HSINJ(2)=HSCINJ+(HSUINJ-HSCINJ)*THS(2,IDX,IVGAS)
234153      C
234154      C For fuel injected vehicles, adjust for the difference between in-use
234155      C and FTP fuel tank levels
234156      C
234157      HSINJ(1)=HSINJ(1)*FULADJ
234158      HSINJ(2)=HSINJ(2)*FULADJ
234159      C
234160      C Weight carbureted and fuel injected rates by corresponding sales fractions
234161      C
234162      HSCAR=(1.0-FINJ(1)-FINJ(2))*HSCAR
234163      HSINJ(1)=FINJ(1)*HSINJ(1)
234164      HSINJ(2)=FINJ(2)*HSINJ(2)
234165      C
234166      C Apply the fuel delivery specific temperature correction factor.
234167      C
234168      30 HSCAR=HSCAR*HSTCF(1)
234169      HSINJ(1)=HSINJ(1)*HSTCF(2)
234170      HSINJ(2)=HSINJ(2)*HSTCF(3)
234171      C
234172      C Combine the hot soak components together to form a fleet value.
234173      C

```

Appendix C: MOBILE4 Function HOTSOK

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```
234174      EVP(1)=HSCAR+HSINJ(1)+HSINJ(2)
234175      C
234176      C Multiply fleet value by the fraction of vehicles with daily trips.
234177      C HDGV and MC daily trip fraction is 1.0, all other vehicles use 0.761.
234178      C
234179      TRIPFR=0.761
234180      IF (IVGAS.GE.4) TRIPFR=1.0
234181      C
234182      HOTSOK=EVP(1)*TRIPFR
234183      C
234184      RETURN
234185      END
```

```

235000      FUNCTION DIURNL(MY,IDX,KEYEQ,IVGAS)
235001      C
235002      C   DIURNL selects the yearly value for diurnal HC.
235003      C
235004      C   Called by CCEVRT.
235005      C
235006      C   Calls EVMAIN.
235007      C
235008      C   Input on call:
235009      C
235010      C       parameter list: MY,IDX,KEYEQ,IVGAS
235011      C       common blocks:
235012      C       /CITCIN/ UDI,IUDI
235013      C       /EVADU2/ IDUAF
235014      C       /EVAPAR/ ISTDC,ISTDT,ISTDP,FINJ
235015      C       /FLAGS3/ TEMFLG
235016      C       /TAMOUT/ TDU
235017      C       /TEMPS/ AMBT,TEMMIN,TEMMAX,TEMEVP
235018      C
235019      C   Output on return:
235020      C
235021      C       function: DIURNL
235022      C       /EVAPGR/ EVP
235023      C
235024      C   Local array subscripts
235025      C
235026      C       DU (5)      - DU (IDU)
235027      C       DUINJ (2) - DUINJ (2)
235028      C
235029      C   Local variable / array dictionary
235030      C
235031      C       Name      Type      Description
235032      C       -----
235033      C   DU          R          diurnal component (1=full, 2=partial: 8AM-11AM,
235034      C                                     3=partial: 10AM-3PM, 4=partial: 8AM-2PM, 5=multiple)
235035      C   DUCAR        R          diurnal loss for carbureted vehicles
235036      C   DUCCAR       R          diurnal loss for controlled/untampered carbureted vehicles
235037      C   DUCINJ       R          diurnal loss for controlled/untampered fuel injected vehicles
235038      C   DUINJ        R          diurnal loss for fuel injected vehicles, 1=TBI, 2=PBI
235039      C   DUUCAR       R          diurnal loss for uncontrolled/tampered carbureted vehicles
235040      C   DUUINJ       R          diurnal loss for uncontrolled/tampered fuel injected vehicles
235041      C   FDU         R          weighted full diurnal loss
235042      C   IDU         I          index for DU indicating full, in-use, 8AM-11AM, 10AM-3PM,
235043      C                                     8AM-2PM, and multiple
235044      C   PDU          R          weighted partial diurnal loss
235045      C   MDU          R          weighted multiple diurnal loss
235046      C
235047      C   Notes:
235048      C
235049      C   DIURNL was modified for MOBILE4. Diurnal = 0 when TEMMAX <= 40F,
235050      C   separate TBI and PFI calculations, expanded LDGV/T calculations.
235051      C
235052      C
235053      C       COMMON /CITCIN/ UDI (5),IUDI,CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW
235054      C       COMMON /EVADU2/ HIDU (2),DULIM (3,2),R2DU (2,2),TPDUAF (7,4,2),IDUAF
235055      C       COMMON /EVAPGR/ EVP (4),GREVP (4,9),VGREVP (4)
235056      C       COMMON /EVAPAR/ IFDS,ISTDC,ISTDT,ISTDP,FINJ (2)
235057      C       COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT

```

Appendix C: MOBILE4 Function DIURNL

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```

235058      COMMON /TAMOUT/  TAMBAG (3,3,20,4) ,THS (2,20,4) ,TDU (20,4) ,TCC (20,4)
235059      COMMON /TEMPS/   AMBT,TEMIN,TEMMAX,TEMEXH (3) ,TEMEVP (6) ,TEMAST (3)
235060      C
235061      DIMENSION DU (5) ,DUINJ (2)
235062      REAL MDU
235063      C
235064      C Diurnal is zero if any evaporative temperature is 40F or less,
235065      C or if minimum temperature is 25F or less.
235066      C
235067      DIURNL=0.0
235068      EVP (2)=0.0
235069      EVP (3)=0.0
235070      IF (TEMMAX .LE.40.0 .OR.
235071      *   AMBT .LE.40.0.AND.TEMFLG.EQ.2 .OR.
235072      *   TEMEVP (1) .LE.40.0 .OR.
235073      *   TEMEVP (2) .LE.40.0 .OR.
235074      *   TEMMIN .LE.25.0) RETURN
235075      C
235076      KEYEVP=2
235077      C
235078      C Compute and combine the controlled and uncontrolled rates for carbureted
235079      C and fuel-injected vehicles.
235080      C
235081      C Compute diurnals for full, partial 8AM-11AM, partial 10AM-3PM, and
235082      C partial 8AM-2PM conditions. These calls to EVMAIN use the
235083      C FTP adjustment factor, so IDUAF=1 (via CITCIN).
235084      C
235085      IDUAF=1
235086      C
235087      C Loop for each diurnal type, except multiple
235088      C
235089      DO 20 IDU=1,4
235090      C
235091      DU (IDU)=0.0
235092      C
235093      C HDGV and MC only have full diurnals, so do not calculate partials.
235094      C
235095      IF (IVGAS.GE.4.AND.IDU.GE.2) GOTO 20
235096      C
235097      C Initialize
235098      C
235099      DUINJ (1)=0.0
235100      DUINJ (2)=0.0
235101      C
235102      C Set UDI index and compute RIVAL based on diurnal type.
235103      C IUDI is also used in EVUNC via common block CITCIN.
235104      C
235105      IUDI=IDU+1
235106      C
235107      RIVAL=UDI (IUDI) /UDI (1)
235108      C
235109      C Motorcycles in MOBILE4 are 100% carbureted and not affected by tampering.
235110      C All HDGV and pre-1981 LDGV/T are 100% carbureted, but are affected by
235111      C tampering. For these vehicle classes, figure a carbureted number
235112      C accordingly and then skip the fuel injected rate case. Reset tampered
235113      C if less than nontampered.
235114      C
235115      CALL EVMAIN (MY,KEYEVP,KEYEQ,IVGAS,ISTDC,RIVAL,DUCCAR)

```


Appendix C: MOBILE4 Function DIURNL

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```

235116      IF (IVGAS.EQ.5) DUCAR=DUCCAR
235117      IF (IVGAS.EQ.5) GOTO 10
235118      CALL EVMAIN(MY,KEYEVP, 2,IVGAS,ISTDC, 0.,DUUCAR)
235119      IF (DUUCAR.LT.DUCCAR) DUUCAR=DUCCAR
235120      DUCAR=DUCCAR+(DUUCAR-DUCCAR)*TDU(IDX,IVGAS)
235121      IF (IVGAS.EQ.4.OR.MY.LT.1981) GOTO 10
235122      C
235123      C If LDGV/T and 1981+, calculate the fuel injected (TBI and PBI)
235124      C vehicle diurnal rates.
235125      C
235126      CALL EVMAIN(MY,KEYEVP,KEYEQ,IVGAS,ISTDT,RIVAL,DUCINJ)
235127      CALL EVMAIN(MY,KEYEVP, 2,IVGAS,ISTDT, 0.,DUUINJ)
235128      IF (DUUINJ.LT.DUCINJ) DUUINJ=DUCINJ
235129      DUINJ(1)=DUCINJ+(DUUINJ-DUCINJ)*TDU(IDX,IVGAS)
235130      C
235131      CALL EVMAIN(MY,KEYEVP,KEYEQ,IVGAS,ISTDP,RIVAL,DUCINJ)
235132      CALL EVMAIN(MY,KEYEVP, 2,IVGAS,ISTDP, 0.,DUUINJ)
235133      IF (DUUINJ.LT.DUCINJ) DUUINJ=DUCINJ
235134      DUINJ(2)=DUCINJ+(DUUINJ-DUCINJ)*TDU(IDX,IVGAS)
235135      C
235136      C Weight carbureted and fuel injected rates by corresponding sales fractions
235137      C and add results together to obtain the fleet diurnal rate.
235138      C
235139      DUCAR=(1.0-FINJ(1)-FINJ(2))*DUCAR
235140      DUINJ(1)=FINJ(1)*DUINJ(1)
235141      DUINJ(2)=FINJ(2)*DUINJ(2)
235142      C
235143      10 DU(1DU)=DUCAR+DUINJ(1)+DUINJ(2)
235144      C
235145      20 CONTINUE
235146      C
235147      C Store the unmodified In-Use diurnal rate
235148      C
235149      30 EVP(2)=DU(1)
235150      C
235151      C Compute the multiple diurnals for CARB, TBI, and PFI and weight by
235152      C sales fractions. Multiple diurnals use the in-use adjustment factor,
235153      C so IDUAF=2 and IUDI=2. (Sent to EVUNC via CITCIN and EVADU2)
235154      C HDGV and pre-1981 LDGV/T do not have fuel injection. MC do not
235155      C have multiple diurnals. Reset tampered if less than nontampered.
235156      C
235157      DUUCAR=0.
235158      DUINJ(1)=0.
235159      DUINJ(2)=0.
235160      C
235161      IF (IVGAS.EQ.5) GOTO 50
235162      C
235163      IDUAF=2
235164      IUDI=2
235165      C
235166      RIVAL=UDI(IUDI)/UDI(1)
235167      C
235168      CALL EVMAIN(MY,KEYEVP,KEYEQ,IVGAS,ISTDC,RIVAL,DUCCAR)
235169      CALL EVMAIN(MY,KEYEVP, 2,IVGAS,ISTDC,RIVAL,DUUCAR)
235170      IF (DUUCAR.LT.DUCCAR) DUUCAR=DUCCAR
235171      IF (IVGAS.EQ.4.OR.MY.LT.1981) GOTO 50
235172      C
235173      CALL EVMAIN(MY,KEYEVP,KEYEQ,IVGAS,ISTDT,RIVAL,DUCINJ)

```


Appendix C: MOBILE4 Function DIURNL

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```

235174      CALL EVMAIN(MY,KEYEVP,    2,IVGAS,ISTDT,RIVAL,DUINJ(1))
235175      IF (DUINJ(1).LT.DUCINJ) DUINJ(1)=DUCINJ
235176      C
235177      CALL EVMAIN(MY,KEYEVP,KEYEQ,IVGAS,ISTDP,RIVAL,DUCINJ)
235178      CALL EVMAIN(MY,KEYEVP,    2,IVGAS,ISTDP,RIVAL,DUINJ(2))
235179      IF (DUINJ(2).LT.DUCINJ) DUINJ(2)=DUCINJ
235180      C
235181      DUUCAR=(1.0-FINJ(1)-FINJ(2))*DUUCAR
235182      DUINJ(1)=FINJ(1)*DUINJ(1)
235183      DUINJ(2)=FINJ(2)*DUINJ(2)
235184      C
235185      50 DU(5)=DUUCAR+DUINJ(1)+DUINJ(2)
235186      C
235187      C Store the unmodified multiple diurnal rate
235188      C
235189      EVP(3)=DU(5)
235190      C
235191      C Compute the weighted full, partial, and multiple diurnal emission
235192      C components. Weighting factors are vehicle dependent.
235193      C
235194      GOTO (60,60,60,70,80),IVGAS
235195      C LDGV/T
235196      60 FDU=DU(1)*0.3406
235197      PDU=DU(2)*0.3236+DU(3)*0.0709+DU(4)*0.0369
235198      MDU=DU(5)*0.80*0.161
235199      GOTO 90
235200      C HDGV
235201      70 FDU=DU(1)*0.498
235202      PDU=0.
235203      MDU=(DU(5)*0.5*0.137)+(DU(5)*0.094)
235204      GOTO 90
235205      C MC
235206      80 FDU=DU(1)
235207      PDU=0.
235208      MDU=0.
235209      C
235210      C Combine the emission components to obtain the total diurnal value.
235211      C
235212      90 DIURNL=FDU+PDU+MDU
235213      C
235214      RETURN
235215      END

```

```
236000      FUNCTION OLDMPD(MY,IV)
236001      C
236002      C OLDMPD selects the old MOBILE3 fixed (not vary w/ vmt) value for miles/day.
236003      C
236004      C Called by CCEVRT.
236005      C
236006      C Calls QUITER.
236007      C
236008      C Input on call:
236009      C
236010      C   parameter list: MY,IV
236011      C   common blocks:
236012      C   /MPDCOM/ MAXMPD,VALMPD,MYGMPD
236013      C
236014      C Output on return:
236015      C
236016      C   function: OLDMPD
236017      C
236018      C
236019      C   COMMON /MPDCOM/ MAXMPD,VALMPD(2,8),MYGMPD(2,8)
236020      C
236021      C   DO 10 IG=1,MAXMPD
236022      C   IF (MY.LE.MYGMPD(IG,IV)) GOTO 20
236023      C   10 CONTINUE
236024      C
236025      C Set default.
236026      C
236027      C   IG=1
236028      C   CALL QUITER(VALMPD(IG,IV),4,60,MY)
236029      C   20 OLDMPD=VALMPD(IG,IV)
236030      C
236031      C   RETURN
236032      C   END
```

Appendix C: MOBILE4 Function CRANKC

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```
237000      FUNCTION CRANKC(MY,IV)
237001      C
237002      C CRANKC selects the yearly value for crankcase HC.
237003      C
237004      C Called by CCEVRT.
237005      C
237006      C Calls QUITER.
237007      C
237008      C Input on call:
237009      C
237010      C   parameter list: MY,IV
237011      C   common blocks:
237012      C   /CRACOM/ MAXCRA,CRAVAL,MYGCRA
237013      C   /REGION/ IREJN
237014      C
237015      C Output on return:
237016      C
237017      C   function: CRANKC
237018      C
237019      C
237020      COMMON /CRACOM/ MAXCRA,CRAVAL (3,8,2),MYGCRA (3,8,2)
237021      COMMON /REGION/ FEET (2),IREJN,ALT,INITPR
237022      C
237023      DO 10 IG=1,MAXCRA
237024      IF (MY.LE.MYGCRA(IG,IV,IREJN)) GOTO 20
237025      10 CONTINUE
237026      C
237027      C Set default.
237028      C
237029      IG=1
237030      CALL QUITER(CRAVAL(IG,IV,IREJN),5,60,MY)
237031      20 CRANKC=CRAVAL(IG,IV,IREJN)
237032      C
237033      RETURN
237034      END
```

Appendix C: MOBILE4 Subroutine EVMAIN

May 5, 1989

```

238000 SUBROUTINE EVMAIN(MY,KEYEVP,KEYEQ,IVGAS,ISTD,RIVAL,EVRATE)
238001 C
238002 C EVMAIN is the driver "main" for the block of functions that calculate
238003 C hot soak or diurnal rates, given the vehicle type, emission standard,
238004 C base/in-use/certification RVP/Index and the untampered/uncontrolled/cert
238005 C equation group specified in the parameter list.
238006 C
238007 C Evap rates are adjusted for high altitude regions (IREJN=2) as follows:
238008 C   Hot Soak High Alt Rate = Hot Soak Low Alt Rate * HIADJ1
238009 C   Diurnal High Alt Rate = Diurnal Low Alt Rate * HIADJ1
238010 C EXCEPT:
238011 C     LDGVs   1972-76my   9.0 RVP => Hot Soak=14.07, Diurnal=17.15
238012 C               11.5 RVP => Hot Soak=20.96, Diurnal=44.93
238013 C               1977my   Same as Low Alt
238014 C               1978-81my High Alt = Low Alt * HIADJ2
238015 C               1984+my   Same as Low Alt
238016 C     LDGT1s  1972-76my   Same as LDGVs
238017 C               1977my   Same as Low Alt
238018 C               1978-81my High Alt = Low Alt * HIADJ2
238019 C
238020 C Called by DIURNL and HOTSOK.
238021 C
238022 C Calls EVPRE, EVSTD, EV81, EV85, EVUNC, EVCERT and EVHI.
238023 C
238024 C Input on call:
238025 C
238026 C   parameter list: MY,KEYEVP,KEYEQ,IVGAS,ISTD,RIVAL,IDUAF
238027 C   common blocks:
238028 C   /EVAHIA/ HIADJ1,HIADJ2
238029 C   /REGION/ IREJN
238030 C
238031 C Output on return:
238032 C
238033 C   parameter list: EVRATE
238034 C
238035 C Notes:
238036 C
238037 C EVMAIN was added for MOBILE4.
238038 C
238039 C
238040 C   COMMON /EVAHIA/ HIHS(2),HIADJ1,HIADJ2
238041 C   COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
238042 C
238043 C   JSTD=ISTD
238044 C
238045 C Function call depends
238046 C   first on the equation group key,
238047 C   second on the vehicle type and
238048 C   third on the emission standard.
238049 C
238050 C   GOTO (10,55,75), KEYEQ
238051 C
238052 C   KEYEQ = 1 = untampered rates
238053 C
238054 C   10 GOTO (15,15,35,50,20), IVGAS
238055 C
238056 C   LDGV/LDGT1
238057 C

```

Appendix C: MOBILE4 Subroutine EVMAIN

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```

238058      15 GOTO (20,25,25,25,30,30,30), ISTD
238059      C
238060      20 EVRATE=EVPRE (KEYEVP,JSTD,IVGAS,RIVAL)
238061          IF (IREJN.EQ.2) EVRATE=EV RATE*HIADJ1
238062          RETURN
238063      25 EVRATE=EVSTD (KEYEVP,JSTD,IVGAS,RIVAL)
238064          IF (IREJN.EQ.1.OR.MY.EQ.1977) RETURN
238065          IF (ISTD.EQ.2) EVRATE=EV RATE*HIADJ1
238066          IF (ISTD.EQ.3) EVRATE=EVHI (KEYEVP,RIVAL)
238067          IF (ISTD.EQ.4) EVRATE=EV RATE*HIADJ2
238068          RETURN
238069      30 IFDS=ISTD-4
238070          EVRATE=EV81 (KEYEVP,IFDS,IVGAS,RIVAL)
238071          IF (IREJN.EQ.1.OR.(IVGAS.EQ.1.AND.MY.GE.1984)) RETURN
238072          IF (MY.EQ.1981) EVRATE=EV RATE*HIADJ2
238073          IF (MY.GT.1981) EVRATE=EV RATE*HIADJ1
238074          RETURN
238075      C
238076      C LDGT2
238077      C
238078      35 GOTO (20,40,45,45,45), ISTD
238079      40 JSTD=4
238080          EVRATE=EVSTD (KEYEVP,JSTD,IVGAS,RIVAL)
238081          IF (IREJN.EQ.2) EVRATE=EV RATE*HIADJ1
238082          RETURN
238083      C
238084      45 IFDS=ISTD-2
238085          EVRATE=EV81 (KEYEVP,IFDS,IVGAS,RIVAL)
238086          IF (IREJN.EQ.2) EVRATE=EV RATE*HIADJ1
238087          RETURN
238088      C
238089      C HDGV
238090      C
238091      50 IF (ISTD.EQ.1) GOTO 20
238092          EVRATE=EV85 (KEYEVP,KEYEQ,IVGAS,RIVAL)
238093          IF (IREJN.EQ.2) EVRATE=EV RATE*HIADJ1
238094          RETURN
238095      C
238096      C KEYEQ = 2 = uncontrolled emissions
238097      C
238098      C IEVPTR will return all ISTD values except cert fuel change cases.
238099      C
238100      55 GOTO (60,60,60,60,20), IVGAS
238101      C
238102      60 EVRATE=EVUNC (KEYEVP,JSTD,IVGAS,RIVAL)
238103          IF (IREJN.EQ.1) RETURN
238104          IF (IVGAS.LE.2.AND.MY.EQ.1977) RETURN
238105          IF (IVGAS.EQ.1.AND.MY.GE.1984) RETURN
238106          EVRATE=EV RATE*HIADJ1
238107          RETURN
238108      C
238109      C KEYEQ = 3 = certification fuel change
238110      C
238111      C Note: cert fuel change only involves rate change(s) on 1981+ LDGV.
238112      C All pre-1981 rates should be the same as untampered.
238113      C
238114      75 GOTO (80,80,85,50,20), IVGAS
238115      C

```


Appendix C: MOBILE4 Subroutine EVMAIN

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```
238116 C LDGV/LDGT1
238117 C
238118     80 IF (ISTD.LT.5) GOTO 10
238119         IFDS=ISTD-4
238120         EVRATE=EVCERT (KEYEVP, IFDS, IVGAS, RIVAL)
238121         IF (IREJN.EQ.1.OR. (IVGAS.EQ.1.AND.MY.GE.1984)) RETURN
238122         IF (MY.EQ.1981) EVRATE=EV RATE*HIADJ2
238123         IF (MY.GT.1981) EVRATE=EV RATE*HIADJ1
238124         RETURN
238125 C
238126 C LDGT2
238127 C
238128     85 IF (ISTD.LT.3) GOTO 35
238129         IFDS=ISTD-2
238130         EVRATE=EVCERT (KEYEVP, IFDS, IVGAS, RIVAL)
238131         IF (IREJN.EQ.2) EVRATE=EV RATE*HIADJ1
238132         RETURN
238133 C
238134     END
```

Appendix C: MOBILE4 Function EVPRE

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```

239000      FUNCTION EVPRE(KEYEVP,JSTD,IVGAS,RIVAL)
239001      C
239002      C  EVPRE calculates a hot soak or diurnal rate for a pre-control emission
239003      C  standard, given the vehicle type and fuel RVP or Wade Index, respectively.
239004      C
239005      C  Called by EVMAIN.
239006      C
239007      C  Input on call:
239008      C
239009      C    parameter list: KEYEVP,JSTD,IVGAS,RIVAL
239010      C    common blocks:
239011      C    /CITRV2/ RVP090
239012      C    /EVADU1/ EFDU,CLDU,HDDU
239013      C    /EVADU2/ R2DU
239014      C    /EVAHS1/ EFHS,CLHS,HDHS
239015      C    /REGION/ IREJN
239016      C
239017      C  Output on return:
239018      C
239019      C    function: EVPRE
239020      C
239021      C  Notes:
239022      C
239023      C  JSTD should be 1 for all vehicle types except MC.  MC can be 1 or 2 or 3.
239024      C
239025      C  EVPRE was added for MOBILE4.
239026      C
239027      C
239028      COMMON /CITRV2/ RVPHS1,RVPHS2,RVPET1,RVPET2,RVP090,RVP100,RVP115
239029      COMMON /EVADU1/ DUEQ(3,2,10),EFDU(4,2),HDDU(2),CLDU(5,2),TPDU(8,2)
239030      COMMON /EVADU2/ HIDU(2),DULIM(3,2),R2DU(2,2),TPDUAF(7,4,2),IDUAF
239031      COMMON /EVAHS1/ HSEQ(3,2,12),EFHS(4,2),HDHS(2),CLHS(5,2)
239032      COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
239033      C
239034      IF (KEYEVP.EQ.2) GOTO 50
239035      C
239036      C  Hot Soak call
239037      C
239038      C  Branch on vehicle type:
239039      C
239040      GOTO (10,10,20,20,30), IVGAS
239041      C
239042      C  LDGV/LDGT1
239043      C
239044      10 EV90=EFHS(1,1)
239045      EV115=EFHS(1,2)
239046      GOTO 40
239047      C
239048      C  LDGT2/HDGV
239049      C
239050      20 EV90=HDHS(1)
239051      EV115=HDHS(2)
239052      GOTO 40
239053      C
239054      C  MC
239055      C
239056      30 EV90=CLHS(JSTD,1)
239057      EV115=CLHS(JSTD,2)

```

Appendix C: MOBILE4 Function EVPRE

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```
239058 C
239059 40 EVPRE=EV90+(EV115-EV90)*(RIVAL-RVPO90)/2.5
239060 RETURN
239061 C
239062 C Diurnal rate call
239063 C
239064 C Branch on the vehicle type:
239065 C
239066 50 GOTO (60,60,70,70,80), IVGAS
239067 C
239068 C LDGV/LDGT1
239069 C
239070 60 EV90=EFDU(1,1)
239071 EV115=EFDU(1,2)
239072 GOTO 90
239073 C
239074 C LDGT2/HDGV
239075 C
239076 70 EV90=HDDU(1)
239077 EV115=HDDU(2)
239078 GOTO 90
239079 C
239080 C MC
239081 C
239082 80 EV90=CLDU(JSTD,1)
239083 EV115=CLDU(JSTD,2)
239084 C
239085 90 KSTD=1
239086 EVPRE=EV90+(EV115-EV90)*(RIVAL-1.0)/(R2DU(KSTD,IREJN)-1.0)
239087 RETURN
239088 C
239089 END
```

Appendix C: MOBILE4 Function EVSTD

May 5, 1989

```

240000      FUNCTION EVSTD(KEYEVP,JSTD,IVGAS,RIVAL)
240001      C
240002      C EVSTD calculates the hot soak or diurnal rate for a standard in the
240003      C controlled to pre-1981 LDGV and LDGT1/2 classes, given the fuel RVP
240004      C or Wade Index, respectively.
240005      C
240006      C Called by EVMAIN.
240007      C
240008      C Calls EV81.
240009      C
240010      C Input on call:
240011      C
240012      C   parameter list: KEYEVP,JSTD,IVGAS,RIVAL
240013      C   common blocks:
240014      C   /CITRV2/ RVP090
240015      C   /EVADU1/ EFDU
240016      C   /EVADU2/ R2DU
240017      C   /EVAHS1/ EFHS
240018      C   /REGION/ IREJN
240019      C
240020      C Output on return:
240021      C
240022      C   function: EVSTD
240023      C
240024      C Local array subscripts:
240025      C
240026      C R2HS(2)      - R2HS ( KSTD )
240027      C
240028      C Local variable / array dictionary:
240029      C
240030      C   Name      Type      Description
240031      C   -----
240032      C   R1         R        low RVP or diurnal index based on low RVP for EV81 call
240033      C   R2         R        high RVP or diurnal index based on high RVP for EV81 call
240034      C   R2HS        R        hot soak values for R2 based on standard
240035      C
240036      C Notes:
240037      C
240038      C The emission rates in this case are to be fitted through the 1981+ LDGV
240039      C or LDGT1/2 curves.
240040      C
240041      C EVSTD was added for MOBILE4.
240042      C
240043      C
240044      C   COMMON /CITRV2/ RVPHS1,RVPHS2,RVPET1,RVPET2,RVP090,RVP100,RVP115
240045      C   COMMON /EVADU1/ DUEQ(3,2,10),EFDU(4,2),HDDU(2),CLDU(5,2),TPDU(8,2)
240046      C   COMMON /EVADU2/ H1DU(2),DULIM(3,2),R2DU(2,2),TPDUAF(7,4,2),IDUAF
240047      C   COMMON /EVAHS1/ HSEQ(3,2,12),EFHS(4,2),HDHS(2),CLHS(5,2)
240048      C   COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
240049      C
240050      C   DIMENSION R2HS(2)
240051      C   DATA R2HS/11.5,11.7/
240052      C
240053      C   IFDS=1
240054      C   KSTD=1
240055      C   IF(JSTD.EQ.4) KSTD=2
240056      C   IF(KEYEVP.EQ.2) GOTO 10
240057      C

```

Appendix C: MOBILE4 Function EVSTD

May 5, 1989

```
240058 C Hot soak rate call
240059 C
240060 R1=RVP090
240061 R2=R2HS (KSTD)
240062 EVSTD=EFHS (JSTD, 1)
240063 * + (EFHS (JSTD, 2) - EFHS (JSTD, 1))
240064 * * (EV81 (KEYEVP, IFDS, IVGAS, RIVAL) - EV81 (KEYEVP, IFDS, IVGAS, R1))
240065 * / (EV81 (KEYEVP, IFDS, IVGAS, R2) - EV81 (KEYEVP, IFDS, IVGAS, R1))
240066 RETURN
240067 C
240068 C Diurnal rate call
240069 C
240070 10 R1=1.0
240071 C
240072 R2=R2DU (KSTD, IREJN)
240073 EVSTD=EFDU (JSTD, 1)
240074 * + (EFDU (JSTD, 2) - EFDU (JSTD, 1))
240075 * * (EV81 (KEYEVP, IFDS, IVGAS, RIVAL) - EV81 (KEYEVP, IFDS, IVGAS, R1))
240076 * / (EV81 (KEYEVP, IFDS, IVGAS, R2) - EV81 (KEYEVP, IFDS, IVGAS, R1))
240077 RETURN
240078 C
240079 END
```


Appendix C: MOBILE4 Function EVHI

May 5, 1989

```

241000      FUNCTION EVHI (KEYEVP,RIVAL)
241001      C
241002      C EVHI calculates the high altitude, 1972-76 model year, hot soak or
241003      C diurnal for LDGVs and LDGTIs given the fuel RVP or Wade Index,
241004      C respectively.
241005      C
241006      C Called by EVMAIN.
241007      C
241008      C Input on call:
241009      C
241010      C   parameter list: KEYEVP,RIVAL
241011      C   common blocks:
241012      C   /CITRV2/ RVP090,RVP115
241013      C   /EVADU2/ HIDU,R2DU
241014      C   /EVAHIA/ HIHS
241015      C   /REGION/ IREJN
241016      C
241017      C Output on return:
241018      C
241019      C   function: EVHI
241020      C
241021      C Local variable / array dictionary:
241022      C
241023      C   Name      Type      Description
241024      C   -----
241025      C   R1         R      low RVP or diurnal Index
241026      C   R2         R      high RVP or diurnal Index
241027      C
241028      C Notes:
241029      C
241030      C EVHI was added for MOBILE4.
241031      C
241032      C
241033      C   COMMON /CITRV2/ RVPHS1,RVPHS2,RVPET1,RVPET2,RVP090,RVP100,RVP115
241034      C   COMMON /EVADU2/ HIDU(2),DULIM(3,2),R2DU(2,2),TPDUAF(7,4,2),IDUAF
241035      C   COMMON /EVAHIA/ HIHS(2),HIADJ1,HIADJ2
241036      C   COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
241037      C
241038      C   IF (KEYEVP.EQ.2) GOTO 10
241039      C
241040      C Hot soak rate call
241041      C
241042      C   R1=RVP090
241043      C   R2=RVP115
241044      C   EVHI = (HIHS(2) * (RIVAL-R1) - HIHS(1) * (RIVAL-R2)) / (R2-R1)
241045      C   RETURN
241046      C
241047      C Diurnal rate call (Note: EVHI currently only called when IREJN = 2.)
241048      C
241049      C   10 R1=1.0
241050      C   KSTD=1
241051      C   R2=R2DU(KSTD,IREJN)
241052      C   EVHI = (HIDU(2) * (RIVAL-R1) - HIDU(1) * (RIVAL-R2)) / (R2-R1)
241053      C   RETURN
241054      C
241055      C   END

```

Appendix C: MOBILE4 Function EV81

May 5, 1989

```

242000      FUNCTION EV81(KEYEVP,IFDS,IVGAS,RIVAL)
242001      C
242002      C EV81 calculates a hot soak or diurnal rate for the 1981+ LDGV and
242003      C LDGT1/2 emission standards, given the fuel delivery system and the
242004      C fuel RVP or Wade Index, respectively.
242005      C
242006      C Called by EVMAIN, EVSTD and EV85.
242007      C
242008      C Input on call:
242009      C
242010      C   parameter list: KEYEVP,IFDS,IVGAS,RIVAL
242011      C
242012      C   common blocks:
242013      C   /CITRV2/ RVP090
242014      C   /CITUSE/ RVUSE1,CIUSE1
242015      C   /EVADU1/ DUEQ
242016      C   /EVADU2/ DULIM
242017      C   /EVAHS1/ HSEQ
242018      C   /EVAPHD/ IVVMAP
242019      C
242020      C Output on return:
242021      C
242022      C   function: EV81
242023      C
242024      C Local variable / array dictionary:
242025      C
242026      C   Name      Type      Description
242027      C   -----
242028      C   IVV        I      vehicle (IVV=1) or truck (IVV=2) classification switch
242029      C   RVPUSE      R      in-use RVP, with lower bound of 8.0 for hot soak
242030      C
242031      C Notes:
242032      C
242033      C EV81 was added for MOBILE4.
242034      C
242035      C
242036      COMMON /CITRV2/ RVPHS1,RVPHS2,RVPET1,RVPET2,RVP090,RVP100,RVP115
242037      COMMON /CITUSE/ RVUSE1,RVUSE2,CIUSE1,CIUSE2
242038      COMMON /EVADU1/ DUEQ (3,2,10),EFDU (4,2),HDDU (2),CLDU (5,2),TPDU (8,2)
242039      COMMON /EVADU2/ HIDU (2),DULIM (3,2),R2DU (2,2),TPDUAF (7,4,2),IDUAF
242040      COMMON /EVAHS1/ HSEQ (3,2,12),EFHS (4,2),HDHS (2),CLHS (5,2)
242041      COMMON /EVAPHD/ HDSAL,HDWGT (2),IVVMAP (5)
242042      C
242043      C
242044      C Untampered 1981+ HS / DI rate = excess RVP effect
242045      C   + malmaintenance &
242046      C   defect effect
242047      C   + standard level
242048      C   + insufficient capacity
242049      C
242050      EXCESS=0.0
242051      IVV=IVVMAP (IVGAS)
242052      C
242053      IF (KEYEVP.EQ.2) GO TO 10
242054      C
242055      C Hot soak
242056      C
242057      EXCESS=HSEQ (IFDS,IVV,1)+HSEQ (IFDS,IVV,2)*RIVAL

```

Appendix C: MOBILE4 Function EV81

May 5, 1989

```

242058      *                      +HSEQ (IFDS, IVV, 3) *RIVAL**2
242059      C
242060      RVPUSE=RVUSE1
242061      IF (RVPUSE.LT.8.0) RVPUSE=8.0
242062      C
242063      EV81=EXCESS
242064      *      +HSEQ (IFDS, IVV, 4) +HSEQ (IFDS, IVV, 5) *RVPUSE
242065      *                      +HSEQ (IFDS, IVV, 6) *RVPUSE**2
242066      *      +HSEQ (IFDS, IVV, 7)
242067      *      +HSEQ (IFDS, IVV, 8)
242068      C
242069      RETURN
242070      C
242071      C Diurnal
242072      C
242073      C Excess diurnal value computed only if Wade Index is one or higher.
242074      C If computed, the equation used depends on whether or not the Wade Index
242075      C exceeds the "diurnal limit".
242076      C
242077      10 IF (RIVAL.LE.DULIM (IFDS, IVV))
242078      *      EXCESS=DUEQ (IFDS, IVV, 1) +DUEQ (IFDS, IVV, 2) *RIVAL
242079      *                      +DUEQ (IFDS, IVV, 3) *RIVAL**2
242080      C
242081      IF (RIVAL.GT.DULIM (IFDS, IVV))
242082      *      EXCESS=DUEQ (IFDS, IVV, 9) +DUEQ (IFDS, IVV, 10) *RIVAL
242083      C
242084      EV81=EXCESS
242085      *      +DUEQ (IFDS, IVV, 4) +DUEQ (IFDS, IVV, 5) *CIUSE1
242086      *                      +DUEQ (IFDS, IVV, 6) *CIUSE1**2
242087      *      +DUEQ (IFDS, IVV, 7)
242088      *      +DUEQ (IFDS, IVV, 8)
242089      C
242090      RETURN
242091      END

```

Appendix C: MOBILE4 Function EV85

May 5, 1989

```

243000      FUNCTION EV85 (KEYEVP,KEYEQ,IVGAS,RIVAL)
243001      C
243002      C EV85 calculates a hot soak or diurnal rate for the 1985+ HDGV emission
243003      C standard, given the equation group and the fuel RVP or Wade Index,
243004      C respectively.
243005      C
243006      C Called by EVMAIN.
243007      C
243008      C Calls EV81 and EVCERT.
243009      C
243010      C Input on call:
243011      C
243012      C   parameter list: KEYEVP,KEYEQ,IVGAS,RIVAL
243013      C
243014      C   common blocks:
243015      C   /EVAPHD/ HDSAL,HDWGT
243016      C
243017      C Output on return:
243018      C
243019      C   function: EV85
243020      C
243021      C Notes:
243022      C
243023      C The uncontrolled equation case does not occur for EV85 (KEYEQ never = 2).
243024      C
243025      C RIVAL is base or local fuel RVP dependent on a untampered call and
243026      C certification fuel RVP dependent on a cert fuel change call.
243027      C
243028      C EV85 was added for MOBILE4.
243029      C
243030      C
243031      C   COMMON /EVAPHD/ HDSAL,HDWGT (2) ,IVVMAP (5)
243032      C
243033      C   IF (KEYEQ.EQ.1)
243034      C *     EV85=EV81 (KEYEVP,1,IVGAS,RIVAL) *HDWGT (1) *HDSAL
243035      C *     +EV81 (KEYEVP,1,IVGAS,RIVAL) *HDWGT (2) * (1.0-HDSAL)
243036      C
243037      C   IF (KEYEQ.EQ.3)
243038      C *     EV85=EVCERT (KEYEVP,1,IVGAS,RIVAL) *HDWGT (1) *HDSAL
243039      C *     +EVCERT (KEYEVP,1,IVGAS,RIVAL) *HDWGT (2) * (1.0-HDSAL)
243040      C
243041      C   RETURN
243042      C   END

```

Appendix C: MOBILE4 Function EVUNC

May 5, 1989

```

244000      FUNCTION EVUNC(KEYEVP,JSTD,IVGAS,RIVAL)
244001      C
244002      C EVUNC calculates a hot soak or diurnal for an uncontrolled (KEYEQ = 2)
244003      C emission equation, given the emission standard context (veh type, MY, etc)
244004      C and the fuel RVP.
244005      C
244006      C Called by EVMAIN.
244007      C
244008      C Input on call:
244009      C
244010      C   parameter list: KEYEVP,JSTD,IVGAS,RIVAL
244011      C   common blocks:
244012      C   /CITRV2/ RVP090
244013      C   /CITCIN/ UDI,IUDI
244014      C   /EVADU2/ TPDUAF,IDUAF
244015      C   /EVAHS2/ TPHS
244016      C   /REGION/ IREJN
244017      C
244018      C Output on return:
244019      C
244020      C   function: EVUNC
244021      C
244022      C Notes:
244023      C
244024      C EVUNC was added for MOBILE4.
244025      C EVUNC was modified for MOBILE4
244026      C
244027      C
244028      COMMON /CITCIN/ UDI (5),IUDI,CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW
244029      COMMON /CITRV2/ RVPHS1,RVPHS2,RVPET1,RVPET2,RVP090,RVP100,RVP115
244030      COMMON /EVADU2/ HIDU (2),DULIM (3,2),R2DU (2,2),TPDUAF (7,4,2),IDUAF
244031      COMMON /EVAHS2/ TPHS (7,4,2)
244032      COMMON /REGION/ FEET (2),IREJN,ALT,INITPR
244033      C
244034      IF (KEYEVP.EQ.2) GOTO 10
244035      C
244036      C Hot Soak
244037      C
244038      EVUNC=TPHS (JSTD,IVGAS,1)
244039      *      + (TPHS (JSTD,IVGAS,2) -TPHS (JSTD,IVGAS,1))
244040      *      * (RIVAL-RVP090) /2.50
244041      RETURN
244042      C
244043      C Diurnal
244044      C
244045      C Use the Uncontrolled Diurnal rate (IUDI dependent) and the
244046      C Tampered Diurnal Adjustment Factor (FTP or In-Use).
244047      C
244048      10 EVUNC=UDI (IUDI)*TPDUAF (JSTD,IVGAS,IDUAF)
244049      RETURN
244050      C
244051      END

```


Appendix C: MOBILE4 Function EVCERT

May 5, 1989

```

245000      FUNCTION EVCERT(KEYEVP,IFDS,IVGAS,RIVAL)
245001      C
245002      C EVCERT calculates a hot soak or diurnal certification fuel change rate,
245003      C given the fuel delivery system and the fuel RVP or Wade Index,
245004      C respectively.
245005      C
245006      C Called by EVMAIN and EV85.
245007      C
245008      C Input on call:
245009      C
245010      C     parameter list: KEYEVP,IFDS,IVGAS,RIVAL
245011      C
245012      C     common blocks:
245013      C     /CITRV2/ RVP090
245014      C     /CITUSE/ RVUSE1,CIUSE1
245015      C     /EVADU1/ DUEQ
245016      C     /EVADU2/ DULIM
245017      C     /EVAHS1/ HSEQ
245018      C     /EVAPHD/ IVVMAP
245019      C
245020      C Output on return:
245021      C
245022      C     function: EVCERT
245023      C
245024      C Local variable / array dictionary:
245025      C
245026      C      Name      Type      Description
245027      C      -----
245028      C      IVV        I      vehicle (IVV=1) or truck (IVV=2) classification switch
245029      C      RVPUSE      R      in-use RVP, with lower bound of 8.0 for hot soak
245030      C
245031      C Notes:
245032      C
245033      C Cert change rates apply only to part of the 2 gram fleet.
245034      C
245035      C EVCERT was added for MOBILE4.
245036      C
245037      C
245038      COMMON /CITRV2/ RVPHS1,RVPHS2,RVPET1,RVPET2,RVP090,RVP100,RVP115
245039      COMMON /CITUSE/ RVUSE1,RVUSE2,CIUSE1,CIUSE2
245040      COMMON /EVADU1/ DUEQ(3,2,10),EFDU(4,2),HDDU(2),CLDU(5,2),TPDU(8,2)
245041      COMMON /EVADU2/ HIDU(2),DULIM(3,2),R2DU(2,2),TPDUAF(7,4,2),IDUAF
245042      COMMON /EVAHS1/ HSEQ(3,2,12),EFHS(4,2),HDHS(2),CLHS(5,2)
245043      COMMON /EVAPHD/ HDSAL,HDWGT(2),IVVMAP(5)
245044      C
245045      C Cert change evap rate = standard level
245046      C                               + excess RVP effect
245047      C                               + malmaintenance &
245048      C                               defect effect
245049      C
245050      C If RIVAL < RVP090 (HS call) or 1.0 Index (DU call), then there is no
245051      C excess RVP effect. Also, the m & d effect is based on RVPICY normalized by
245052      C 11.5 / ASTM RVP (HS call) or Index computed from RVP = RVP090 (DU call).
245053      C
245054      EXCESS=0.0
245055      IVV=IVVMAP(IVGAS)
245056      IF (KEYEVP.EQ.2) GOTO 10
245057      C

```

Appendix C: MOBILE4 Function EVCERT

May 5, 1989

```

245058 C Hot soak
245059 C
245060 IF (RIVAL.GE.RVP090)
245061 * EXCESS=HSEQ(IFDS,IVV,1)+HSEQ(IFDS,IVV,2)*RIVAL
245062 * +HSEQ(IFDS,IVV,3)*RIVAL**2
245063 C
245064 RVPUSE=RVUSE1
245065 IF (RVPUSE.LT.8.0) RVPUSE=8.0
245066 C
245067 EVCERT=HSEQ(IFDS,IVV,7)
245068 * +EXCESS
245069 * +HSEQ(IFDS,IVV,4)+HSEQ(IFDS,IVV,5)*RVPUSE
245070 * +HSEQ(IFDS,IVV,6)*RVPUSE**2
245071 RETURN
245072 C
245073 C Diurnal
245074 C
245075 C Excess diurnal value computed only if Wade Index is one or higher.
245076 C If computed, the equation used depends on whether or not the Wade Index
245077 C exceeds the "diurnal limit".
245078 C
245079 10 IF (RIVAL.GE.1.0.AND.RIVAL.LE.DULIM(IFDS,IVV))
245080 * EXCESS=DUEQ(IFDS,IVV,1)+DUEQ(IFDS,IVV,2)*RIVAL
245081 * +DUEQ(IFDS,IVV,3)*RIVAL**2
245082 C
245083 IF (RIVAL.GE.1.0.AND.RIVAL.GT.DULIM(IFDS,IVV))
245084 * EXCESS=DUEQ(IFDS,IVV,9)+DUEQ(IFDS,IVV,10)*RIVAL
245085 C
245086 EVCERT=DUEQ(IFDS,IVV,7)
245087 * +EXCESS
245088 * +DUEQ(IFDS,IVV,4)+DUEQ(IFDS,IVV,5)*CIUSE1
245089 * +DUEQ(IFDS,IVV,6)*CIUSE1**2
245090 C
245091 RETURN
245092 END

```

Appendix C: MOBILE4 Function RULOSS

May 5, 1989

```

246000      FUNCTION RULOSS(MY,IDX,IVTL,RVUSE1,RVUSE2)
246001      C
246002      C RULOSS computes the Running Loss value for each model year and gas
246003      C vehicle class at the given RVP and running Loss temperature using
246004      C 4-point linear interpolation.
246005      C
246006      C Called by HCCALX.
246007      C
246008      C Input on call:
246009      C
246010      C   parameter list: MY,IDX,IVTL,RVUSE1,RVUSE2
246011      C   common blocks:
246012      C   /CITCIN/ ICERSW
246013      C   /FLAGS3/ TEMFLG
246014      C   /RUNLS3/ RULBAS,RULCAN,RULCAP
246015      C   /RUNLS5/ RULRVP,RULTEM
246016      C   /RVPNAT/ ICERSY
246017      C   /TAMOUT/ THS
246018      C   /TAMOU2/ GCONLY
246019      C   /TEMPS/ TEMEVP
246020      C
246021      C Output on return:
246022      C
246023      C   function: RULOSS
246024      C
246025      C Local variable / array dictionary:
246026      C
246027      C   Name      Type      Description
246028      C   -----
246029      C   CANOFF    R        interpolated running loss canister disconnect tampering offset
246030      C   CAPOFF    R        interpolated running loss gas cap removal tampering offset
246031      C   EM11      R        running loss emission (or offset) at lower boundary
246032      C                        temperature and lower boundary RVP
246033      C   EM12      R        running loss emission (or offset) at lower boundary
246034      C                        temperature and upper boundary RVP
246035      C   EM21      R        running loss emission (or offset) at upper boundary
246036      C                        temperature and lower boundary RVP
246037      C   EM22      R        running loss emission (or offset) at upper boundary
246038      C                        temperature and upper boundary RVP
246039      C   EMT1      R        interpolated running loss emission (or offset)
246040      C                        at the input RVP and the lower boundary temperature
246041      C   EMT2      R        interpolated running loss emission (or offset)
246042      C                        at the input RVP and the upper boundary temperature
246043      C   RVP1      R        lower boundary RVP
246044      C   RVP2      R        upper boundary RVP
246045      C   RVPRL     R        running loss RVP
246046      C   TEMRL     R        running loss temperature
246047      C   TMP1      R        lower boundary temperature
246048      C   TMP2      R        upper boundary temperature
246049      C
246050      C Notes:
246051      C
246052      C RULOSS was added for MOBILE4.
246053      C
246054      C
246055      COMMON /CITCIN/ UDI(5),IUDI,CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW
246056      COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
246057      COMMON /RVPNAT/ ICERSY,RVPCER,RVPLIM(2),RVPDIU(2),PFUL,EINCR

```

Appendix C: MOBILE4 Function RULOSS

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```

246058      COMMON /RUNLS3/ RULBAS (4,4,4,4),RULCAN (4,4),RULCAP (4,4)
246059      COMMON /RUNLS5/ RULRVP (4),RULTEM (4)
246060      COMMON /TAMOUT/ TAMBAG (3,3,20,4),THS (2,20,4),TDU (20,4),TCC (20,4)
246061      COMMON /TAMOU2/ TOB (20,4),GCONLY (20,4)
246062      COMMON /TEMPS/ AMBT,TEMMIN,TEMMAX,TEMEXH (3),TEMEVP (6),TEMAST (3)
246063      C
246064      C Initialize
246065      C
246066      RULOSS=0.0
246067      C
246068      C Running loss is zero if any evaporative temperature is 40F or less,
246069      C or if minimum temperature is 25F or less.
246070      C
246071      IF (TEMMAX .LE.40.0 .OR.
246072      * AMBT .LE.40.0.AND.TEMFLG.EQ.2 .OR.
246073      * TEMEVP (1) .LE.40.0 .OR.
246074      * TEMEVP (2) .LE.40.0 .OR.
246075      * TEMMIN .LE.25.0) RETURN
246076      C
246077      C Choice of RVP depends on whether or not cert fuel change applies to the
246078      C current MY.
246079      C
246080      RVPRL=RVUSE1
246081      IF (ICERSW.EQ.2.AND.ICERSY.LE.MY) RVPRL=RVUSE2
246082      C
246083      C Reset RVP and Running Loss Temperature if above running loss limits
246084      C
246085      IF (RVPRL.LT.RULRVP (1)) RVPRL=RULRVP (1)
246086      IF (RVPRL.GT.RULRVP (4)) RVPRL=RULRVP (4)
246087      C
246088      TEMRL=TEMEVP (2)
246089      IF (TEMRL.GT.RULTEM (4)) TEMRL=RULTEM (4)
246090      C
246091      C Find and assign the bracketing temperature values.
246092      C
246093      DO 20 ITLT=1,3
246094      IF (TEMRL.LE.RULTEM (ITLT)) GOTO 30
246095      20 CONTINUE
246096      C
246097      ITLT=4
246098      C
246099      30 TMP1=40.0
246100      IF (ITLT.GT.1) TMP1=RULTEM (ITLT-1)
246101      TMP2=RULTEM (ITLT)
246102      C
246103      C Find and assign the bracketing RVP values.
246104      C
246105      DO 40 ITLR=2,3
246106      IF (RVPRL.LE.RULRVP (ITLR)) GOTO 50
246107      40 CONTINUE
246108      C
246109      ITLR=4
246110      C
246111      50 RVP1=RULRVP (ITLR-1)
246112      RVP2=RULRVP (ITLR)
246113      C
246114      C Determine model year pointer
246115      C

```


Appendix C: MOBILE4 Function RULOSS

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```

246116      IGT1=IRULPT(MY,IVTL)
246117      C
246118      C   Assign bracketing running loss emission values
246119      C
246120      EM11=0.0
246121      IF (ITLT.GT.1) EM11=RULBAS(ITLR-1,ITLT-1,IGTL,IVTL)
246122      C
246123      EM12=0.0
246124      IF (ITLT.GT.1) EM12=RULBAS(ITLR,ITLT-1,IGTL,IVTL)
246125      C
246126      EM21=RULBAS(ITLR-1,ITLT,IGTL,IVTL)
246127      C
246128      EM22=RULBAS(ITLR,ITLT,IGTL,IVTL)
246129      C
246130      C   Interpolate first on RVP, then temperature
246131      C
246132      EMT1=RVPRL*(EM12-EM11)/(RVP2-RVP1)
246133      *   + (RVP2*EM11-RVP1*EM12)/(RVP2-RVP1)
246134      EMT2=RVPRL*(EM22-EM21)/(RVP2-RVP1)
246135      *   + (RVP2*EM21-RVP1*EM22)/(RVP2-RVP1)
246136      C
246137      RULOSS=TEMRL*(EMT2-EMT1)/(TMP2-TMP1)
246138      *   + (TMP2*EMT1-TMP1*EMT2)/(TMP2-TMP1)
246139      C
246140      C   In the same fashion, compute the running loss canister disconnect and
246141      C   gas cap removal tampering offsets
246142      C
246143      C   Assign bracketing running loss canister disconnect offset values
246144      C
246145      EM11=0.0
246146      IF (ITLT.GT.1) EM11=RULCAN(ITLR-1,ITLT-1)
246147      C
246148      EM12=0.0
246149      IF (ITLT.GT.1) EM12=RULCAN(ITLR,ITLT-1)
246150      C
246151      EM21=RULCAN(ITLR-1,ITLT)
246152      C
246153      EM22=RULCAN(ITLR,ITLT)
246154      C
246155      C   Interpolate first on RVP, then temperature
246156      C
246157      EMT1=RVPRL*(EM12-EM11)/(RVP2-RVP1)
246158      *   + (RVP2*EM11-RVP1*EM12)/(RVP2-RVP1)
246159      EMT2=RVPRL*(EM22-EM21)/(RVP2-RVP1)
246160      *   + (RVP2*EM21-RVP1*EM22)/(RVP2-RVP1)
246161      C
246162      CANOFF=TEMRL*(EMT2-EMT1)/(TMP2-TMP1)
246163      *   + (TMP2*EMT1-TMP1*EMT2)/(TMP2-TMP1)
246164      C
246165      C   Assign bracketing running loss gas cap removal offset values
246166      C
246167      EM11=0.0
246168      IF (ITLT.GT.1) EM11=RULCAP(ITLR-1,ITLT-1)
246169      C
246170      EM12=0.0
246171      IF (ITLT.GT.1) EM12=RULCAP(ITLR,ITLT-1)
246172      C
246173      EM21=RULCAP(ITLR-1,ITLT)

```


Appendix C: MOBILE4 Function RULOSS

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```
246174 C
246175     EM22=RULCAP(ITLR,ITLT)
246176 C
246177 C Interpolate first on RVP, then temperature
246178 C
246179     EMT1=RVPRL*(EM12-EM11)/(RVP2-RVP1)
246180 *     + (RVP2*EM11-RVP1*EM12)/(RVP2-RVP1)
246181     EMT2=RVPRL*(EM22-EM21)/(RVP2-RVP1)
246182 *     + (RVP2*EM21-RVP1*EM22)/(RVP2-RVP1)
246183 C
246184     CAPOFF=TEMRL*(EMT2-EMT1)/(TMP2-TMP1)
246185 *     + (TMP2*EMT1-TMP1*EMT2)/(TMP2-TMP1)
246186 C
246187 C Apply the tampering offsets. The offsets are appropriately weighted
246188 C by canister only (THS(1,)) and gas cap removal only (GCONLY).
246189 C
246190     RULOSS=RULOSS
246191 *     +CANOFF*THS(1,IDX,IVTL)
246192 *     +CAPOFF*GCONLY(IDX,IVTL)
246193 C
246194     RETURN
246195     END
```

Appendix C: MOBILE4 Function BEF

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```

247000      FUNCTION BEF (MY,IDX,ICY,IP,IV,VTAGE,IBEF5W)
247001      C
247002      C BEF returns the basic emission factor adjusted for operating mode,
247003      C CO temperature offset, methane offset, temperature, inspection / maintenance
247004      C and tampering offset.
247005      C
247006      C Called by BEFIDL, EFCALX and HCCALX.
247007      C
247008      C Calls IERPTR and PCLEFT.
247009      C
247010      C Input on call or from calls:
247011      C
247012      C   parameter list: MY,IDX,ICY,IP,IV,VTAGE
247013      C   common blocks:
247014      C   /BASEQ1/ ERBZML,ERBDR,ERB50K
247015      C   /BASEQ5/ ERUZML,ERUDR,ERU50K
247016      C   /BASEQ6/ KEYER
247017      C   /OFFSET/ OFFCO,OFFMTH
247018      C   /OMTCOM/ OMTCF,OMTTAM
247019      C   /REGION/ IREJN
247020      C   /TAMEQ1/ F50K
247021      C
247022      C Output on return:
247023      C
247024      C   function: BEF
247025      C
247026      C Local variable / array dictionary:
247027      C
247028      C   Name      Type      Description
247029      C   -----
247030      C   ABOV50    R          for a given ICY & MY, the vmt in excess of 50000 miles
247031      C   IGER50    I          MY pointer into ERB50K
247032      C   KINK50    I          key to whether or not to use the 50K+ deterioration rates:
247033      C                       1 = no: no 50K kink in the curve or do not reach it
247034      C                       2 = yes: have 50K kink & do reach it (mileage exceeds 50K)
247035      C   SLOPE1    R          slope of ef curve; if 50K kink, then only for 1st 50K miles
247036      C   SLOPE2    R          slope of kinked ef curve when beyond 50K miles
247037      C   ZPOINT    R          zero mileage point = intercept of ef curve
247038      C
247039      C Notes:
247040      C
247041      C The offsets (additive instead of MOBILE2's multiplicative) for CO bag 1
247042      C and methane were encoded. The new tampering offset was inserted.
247043      C The operating mode and temperature multiplicative correction factor was
247044      C split from the old CFRET and moved from EFCALX to BEF for application.
247045      C
247046      C The separate user supplied ER arrays were added in MOBILE4.
247047      C The kinked ef curve for 1981+ LDGV HC/CO was added in MOBILE4.
247048      C BEF was modified for MOBILE4, updating several common block declarations.
247049      C BEF was modified for MOBILE4, applying PCLEFT before subtracting LOWCO.
247050      C
247051      C
247052      COMMON /BASEQ1/ ERBZML (20,3,8,2),ERBDR (20,3,8,2),ERB50K (12,2,2)
247053      COMMON /BASEQ5/ ERUZML (12,3,8,2),ERUDR (12,3,8,2),ERU50K (12,2,2)
247054      COMMON /BASEQ6/ MYGERU (12,2,3,8,2),MAXERU,NUMERU (3,8,2),KEYER,IGER
247055      COMMON /OFFSET/ OFFCO (20,3),OFFMTH (20,8)
247056      COMMON /OMTCOM/ OMTCF (20,3,8),OMTTAM (20,3,4)
247057      COMMON /REGION/ FEET (2),IREJN,ALT,INITPR

```

Appendix C: MOBILE4 Function BEF

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```

247058      COMMON /TAMEQ1/ TAMZML(9,4,2,2),TAMDR(9,4,3,2),MYGTAM(4),IGT5,F50K
247059      C
247060      ABOV50=VMTAGE-F50K
247061      KINK50=1
247062      IF (MY.GE.1981.AND.IP.LE.2.AND.IV.EQ.1.AND.ABOV50.GT.0.0) KINK50=2
247063      C
247064      C Look up base and deterioration rates. Pointer function IERPTR sets both
247065      C the arrays to access (block data default or user supplied) and the cell
247066      C pointers to the coefficients. KINK50 determines if a second slope is needed.
247067      C
247068      CALL IERPTR(MY,IP,IV)
247069      IF (KEYER.EQ.2) GOTO 10
247070      C
247071      ZPOINT=ERBZML(IGER,IP,IV,IREJN)
247072      SLOPE1=ERBDR(IGER,IP,IV,IREJN)
247073      IF (KINK50.EQ.1) GOTO 20
247074      IF (MY.LE.1992) IGER50=MY-1981+1
247075      IF (MY.GT.1992) IGER50=12
247076      SLOPE2=ERB50K(IGER50,IP,IREJN)
247077      GOTO 20
247078      C
247079      10 ZPOINT=ERUZML(IGER,IP,IV,IREJN)
247080      SLOPE1=ERUDR(IGER,IP,IV,IREJN)
247081      IF (KINK50.EQ.2) SLOPE2=ERU50K(IGER,IP,IREJN)
247082      C
247083      C Compute the uncorrected basic emission factor.
247084      C
247085      20 IF (KINK50.EQ.1) BEF=ZPOINT+SLOPE1*VMTAGE
247086      IF (KINK50.EQ.2) BEF=ZPOINT+SLOPE1*F50K+SLOPE2*ABOV50
247087      C
247088      C If IBEFSW = 1 BEF returns the uncorrected factors,
247089      C otherwise it performs adjustments.
247090      C
247091      IF (IBEFSW.EQ.1) GOTO 99
247092      C
247093      C Adjust for operating mode, offset model (CO, LDGV & LDGT only),
247094      C methane offset (HC only), temperature & inspection / maintenance.
247095      C
247096      IF (IV.LE.3.AND.IP.EQ.2)
247097      * BEF=(BEF*OMTCF(IDX,IP,IV)*PCLEFT(MY,ICY,IP,IV))+OFFCO(IDX,IV)
247098      IF (IP.EQ.1)
247099      * BEF=(BEF*OMTCF(IDX,IP,IV)-OFFMTH(IDX,IV))*PCLEFT(MY,ICY,IP,IV)
247100      IF (IP.EQ.3.OR.IV.GT.3.AND.IP.EQ.2)
247101      * BEF=BEF*OMTCF(IDX,IP,IV)*PCLEFT(MY,ICY,IP,IV)
247102      C
247103      C GV/T => add corrected (for op mode & temp) tampering bag emissions.
247104      C
247105      IF (IV.LE.4) BEF=BEF+OMTTAM(IDX,IP,IV)
247106      C
247107      99 RETURN
247108      END

```

```

248000      FUNCTION PCLEFT(MY,ICY,IP,IV)
248001      C
248002      C PCLEFT determines the basic emission factor multiplicative adjustment
248003      C ( = percentage left of BEF = PCLEFT ) for the effects of an inspection /
248004      C maintenance (I/M) program, after checking whether or not I/M applies to the
248005      C factor being computed by the calling function.
248006      C
248007      C Called by BEF.
248008      C
248009      C Calls IMPTR.
248010      C
248011      C Input on call:
248012      C
248013      C   parameter list: MY,ICY,IP,IV
248014      C   common blocks:
248015      C   /FLAGS2/ IMFLAG
248016      C   /ICR4VA/ CRD4VA
248017      C   /ICR4VB/ CRD4VB
248018      C   /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER,CRIM
248019      C   /IMPAR2/ ILDT,ITEST
248020      C   /IMPAR5/ CRHDGV,DISCNT
248021      C   /IMPAR6/ IFREQ,INTYP
248022      C   /IM12HC/ CR12HC
248023      C   /IM12CO/ CR12CO
248024      C
248025      C Output on return:
248026      C
248027      C   function: PCLEFT
248028      C
248029      C Local variable / array dictionary:
248030      C
248031      C   Name      Type      Description
248032      C   -----
248033      C   AGEIST    I        age of the vehicle at first inspection
248034      C   BY        I        benefit year for technology 1 or 2 vehicle
248035      C   IBY        I        benefit year for technology 4 plus vehicle
248036      C   IREM       I        remainder = stringency - greatest multiple of 10 < stringency
248037      C   ISTRN      I        stringency index into technology 1 or 2 credits array
248038      C   REM        R        IREM converted to REAL value
248039      C   WAIV      R        waiver rate used on this call, depends on MY
248040      C
248041      C Notes:
248042      C
248043      C PCLEFT was updated for MOBILE4 for the new I/M Program modeling algorithm.
248044      C
248045      C
248046      C   CHARACTER*4 IMNAME
248047      C   INTEGER ALHFLG
248048      C
248049      C   COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
248050      C   COMMON /IM12HC/ CR12HC(19,20,5,2)
248051      C   COMMON /IM12CO/ CR12CO(19,20,5,2)
248052      C   COMMON /ICR4VA/ CRD4VA(19,2,12,3)
248053      C   COMMON /ICR4VB/ CRD4VB(19,2,12,3)
248054      C   COMMON /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER(2),CRIM
248055      C   COMMON /IMPAR2/ ILDT(4),ITEST,NUDATA(2),NONUDA,NLIM,IMNAME(20,9)
248056      C   COMMON /IMPAR5/ MYGIM2(3,3),LBIM4P,CRHDGV(2,2),DISCNT(3)
248057      C   COMMON /IMPAR6/ IFREQ,INTYP

```


Appendix C: MOBILE4 Function PCLEFT

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```

248058 C
248059     INTEGER BY,AGE1ST
248060 C
248061 C Initialize PCLEFT to "no reduction" value = 1.0.
248062 C
248063     PCLEFT=1.0
248064 C
248065 C If factor being calculated by BEF is not covered by I/M, then RETURN.
248066 C
248067     IF (IMFLAG.EQ.1.OR.IP.EQ.3.OR.IV.GT.4) GOTO 99
248068     IF (ILDT (IV) .EQ.1.OR.
248069 *     ICY.EQ.MY.OR.ICY.LE.ICYIM.OR.
248070 *     MY.LT.MODYR1.OR.MY.GT.MODYR2) GOTO 99
248071 C
248072 C Assign waiver rates
248073 C
248074     IF (MY.LE.1980) WAIV=WAIVER (1)
248075     IF (MY.GT.1980) WAIV=WAIVER (2)
248076 C
248077     IF (IV.EQ.4) GOTO 50
248078 C
248079 C Selecting I/M reduction for LDGV or LDGT. Several parameters must be set.
248080 C
248081 C Find the benefit year:
248082 C
248083     BY=ICY-ICYIM
248084     IF (MY.GT.ICYIM) BY=ICY-MY
248085     IF (BY.GT.19) BY=19
248086 C
248087 C Find the age of the vehicle at first inspection.
248088 C
248089     AGE1ST=1
248090     IF (MY.LT.ICYIM) AGE1ST=ICYIM-MY+1
248091 C
248092 C Determine technology by model year and vehicle type.
248093 C
248094     ITECH=IMPTR (MY,IV)
248095 C
248096 C For now, continue MOBILE3 policy of using technology 2 credits for ITECH=3.
248097 C
248098     IF (ITECH.EQ.3) ITECH=2
248099 C
248100 C Branch on technology type: TECH 1 & 2 form 1 group, TECH 4+ another.
248101 C
248102     IF (ITECH.GE.4) GOTO 40
248103 C
248104 C Select correct I/M credits for TECH 1 & 2. The same credits array is used
248105 C for LDGV and LDGT, but the ITECH mygs differ, so that the same MY may yield
248106 C a different credit for LDGV than for LDGT.
248107 C
248108 C Interpolate between 10,20,30,40 & 30% stringency.
248109 C
248110     IREM=ISTRIN- (ISTRIN/10)*10
248111     REM=IREM*.1
248112     ISTRN= (ISTRIN-IREM)/10
248113 C
248114     IF (IFREQ.EQ.1) THEN
248115         IF (IP.EQ.1) THEN

```


Appendix C: MOBILE4 Function PCLEFT

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```

248116      PCRED=CR12HC (BY,AGE1ST,ISTRN,ITECH)
248117      IF (ISTRN.LT.5.AND.IREM.GT.0) PCRED=
248118      *      (CR12HC (BY,AGE1ST,ISTRN+1,ITECH) -PCRED) *REM+PCRED
248119      ELSE IF (IP.EQ.2) THEN
248120      PCRED=CR12CO (BY,AGE1ST,ISTRN,ITECH)
248121      IF (ISTRN.LT.5.AND.IREM.GT.0) PCRED=
248122      *      (CR12CO (BY,AGE1ST,ISTRN+1,ITECH) -PCRED) *REM+PCRED
248123      ENDIF
248124      C
248125      ELSE IF (IFREQ.EQ.2) THEN
248126      IF (IP.EQ.1) THEN
248127      PCRED=CR12HC (20-BY,21-AGE1ST,ISTRN,ITECH)
248128      IF (ISTRN.LT.5.AND.IREM.GT.0) PCRED=
248129      *      (CR12HC (20-BY,21-AGE1ST,ISTRN+1,ITECH) -PCRED) *REM+PCRED
248130      ELSE IF (IP.EQ.2) THEN
248131      PCRED=CR12CO (20-BY,21-AGE1ST,ISTRN,ITECH)
248132      IF (ISTRN.LT.5.AND.IREM.GT.0) PCRED=
248133      *      (CR12CO (20-BY,21-AGE1ST,ISTRN+1,ITECH) -PCRED) *REM+PCRED
248134      ENDIF
248135      C
248136      ENDIF
248137      C
248138      GOTO 60
248139      C
248140      C Select I/M credits for TECH 4+ vehicles. For TECH 4+, there are separate
248141      C credits arrays, one for annual and one for biennial inspection programs.
248142      C
248143      40 IBY=BY+AGE1ST-1
248144      IF (IFREQ.EQ.1) PCRED=CRD4VA (IBY,IP,ITECH-3,ITEST)
248145      IF (IFREQ.EQ.2) PCRED=CRD4VB (IBY,IP,ITECH-3,ITEST)
248146      GOTO 60
248147      C
248148      C Assign HDGV I/M credit.
248149      C
248150      50 PCRED=CRHDGV (IP,IFREQ)
248151      C
248152      C Set I/M benefit adjusted for waivers and enforcement and discount
248153      C
248154      60 PCLEFT=1.0- (PCRED* (1.0-WAIV) *ENFORC (CRIM,1) *DISCNT (INTYP))
248155      C
248156      99 RETURN
248157      END

```

```

249000      SUBROUTINE IDLCAL(ICY,VMLDGT,INERR)
249001      C
249002      C IDLCAL calculates the idle emission factors.
249003      C
249004      C Called by EFCALX.
249005      C
249006      C Calls BEFIDL, IGSFPT and QUITER.
249007      C
249008      C Input on call:
249009      C
249010      C   parameter list: ICY,VMLDGT,INERR
249011      C   common blocks:
249012      C   /BASEQ7/ IPMOD
249013      C   /CUMCOM/ CUMMIL
249014      C   /FLAGS2/ NEWFLG
249015      C   /FLAGS4/ PRTFLG
249016      C   /GSFCOM/ GSFRAC
249017      C   /MAXIMA/ MAXVEH,MAXPOL,MAXYRS
249018      C   /MYRCAL/ TF
249019      C   /REGION/ IREJN
249020      C   /VMXCOM/ VMTMIX
249021      C
249022      C Output on return:
249023      C
249024      C   parameter list: INERR
249025      C   common blocks:
249026      C   /RESUL2/ EFIDLE
249027      C   /RESUL3/ VIDLE
249028      C
249029      C Local variable / array dictionary:
249030      C
249031      C   Name      Type      Description
249032      C   -----
249033      C   IDLFAC    R        idle emission factor for IDX: summed across IDX to get
249034      C                       EFIDLE for the given IP & IV
249035      C
249036      C Notes:
249037      C
249038      C IDLCAL was added for MOBILE4.
249039      C
249040      C
249041      C   INTEGER ALHFLG
249042      C   INTEGER PRTFLG,HCFLAG
249043      C   REAL JANMYR
249044      C
249045      C   COMMON /BASEQ7/ IPMOD(3)
249046      C   COMMON /CUMCOM/ CUMMIL(20,8)
249047      C   COMMON /FLAGS2/ MYMRF,NEWFLG,IMFLAG,ALHFLG
249048      C   COMMON /FLAGS4/ PRTFLG,IDLF,MMHFLG,HCFLAG
249049      C   COMMON /GSFCOM/ MAXGSF,GSFRAC(22,8,2),MYGSF(22,8,2)
249050      C   COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
249051      C   COMMON /MYRCAL/ XMYM(20,8),JANMYR(20,8),TF(20,8),TFMYM(20,8)
249052      C   COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
249053      C   COMMON /RESUL2/ EFIDLE(3,9)
249054      C   COMMON /RESUL3/ VFTP(3),VEXH,VEVAP,VLOSS,VRUNLS,VIDLE(3)
249055      C   COMMON /VMXCOM/ REGMIX(8),TFNORM(8),VMTMIX(8)
249056      C
249057      C   REAL IDLFAC

```

```

249058 C
249059 DO 50 IP=1,MAXPOL
249060 IF (PRTFLG.NE.IP.AND.PRTFLG.NE.4) GOTO 50
249061 VIDLE(IP)=0.0
249062 EFIDLE(IP,9)=0.0
249063 C
249064 DO 30 IV=1,MAXVEH
249065 EFIDLE(IP,IV)=0.0
249066 IF (VMTMIX(IV).EQ.0.0) GOTO 30
249067 C
249068 DO 10 IDX=1,MAXYRS
249069 C
249070 C See EFCALX explanation for this TF check.
249071 C
249072 IF (TF(IDX,IV).LE.0.0) GOTO 10
249073 C
249074 C Initialize emissions to zero and figure parameters.
249075 C
249076 IDLFAC=0.0
249077 JDX=21-IDX
249078 VMTAGE=CUMMIL(JDX,IV)/10000.
249079 MY=ICY+IDX-20
249080 IGS=IGSFPT(MY,IV)
249081 C
249082 C Compute idle emissions.
249083 C
249084 IDLFAC=BEFIDL(MY,IDX,IP,IV,VMTAGE)*TF(IDX,IV)
249085 EFIDLE(IP,IV)=EFIDLE(IP,IV)+IDLFAC
249086 10 CONTINUE
249087 C
249088 C NEWFLG versus calculated emissions check. Improve by checking all 20 IDX
249089 C for use/non-use of NEWFLG & err exit only on non-use of alternate equations.
249090 C Skip for IV for which MOBILE4 does not store gas-diesel combined
249091 C registrations (splitting them with GSFRAC during execution).
249092 C
249093 IF (IV.EQ.4.OR.IV.GE.7) GOTO 20
249094 IF (NEWFLG.EQ.1.AND.EFIDLE(IP,IV).GT.0.
249095 * .AND.GSFRAC(IGS,IV,IREJN).EQ.0.0) CALL QUITER(0.,IV,69,INERR)
249096 20 IF (NEWFLG.EQ.1.AND.EFIDLE(IP,IV).LE.0.0)
249097 * CALL QUITER(0.,IV,70,INERR)
249098 C
249099 30 CONTINUE
249100 C
249101 C Assign composite light duty gas truck emission factor.
249102 C
249103 IF (EFIDLE(IP,2).GT.0.0.AND.EFIDLE(IP,3).GT.0.0) EFIDLE(IP,9)=
249104 * (EFIDLE(IP,2)*VMTMIX(2)+EFIDLE(IP,3)*VMTMIX(3))/VMDGT
249105 C
249106 C If one or more of the IV for a given IP have had 1 or more replacement basic
249107 C FTP ef parameters records accepted via NEWFLG and therefore had all the
249108 C corresponding idle ef parameters zeroed out, then it does not make sense to
249109 C calculate a weighted by IV idle ef (VIDLE).
249110 C
249111 IF (IPMOD(IP).EQ.1) GOTO 50
249112 DO 40 IV=1,MAXVEH
249113 VIDLE(IP)=VIDLE(IP)+EFIDLE(IP,IV)*VMTMIX(IV)
249114 40 CONTINUE
249115 50 CONTINUE

```

Appendix C: MOBILE4 Subroutine IDLCAL

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249116 C
249117 RETURN
249118 END

Appendix C: MOBILE4 Function BEFIDL

May 5, 1989

```

250000      FUNCTION BEFIDL(MY,IDX,IP,IV,VMTAGE)
250001      C
250002      C BEFIDL returns the basic idle emission factor adjusted for I/M, methane,
250003      C and tampering, depending on the case.
250004      C
250005      C Called by IDLCAL.
250006      C
250007      C Calls BEF, IBFPTR, IDLPTR and PCLEFT.
250008      C
250009      C Input on call:
250010      C
250011      C     parameter list: MY,IDX,IP,IV,VMTAGE
250012      C     common blocks:
250013      C     /BASEQ6/ NUMERU
250014      C     /FLAGS4/ NMHFLG
250015      C     /IDLEQ1/ ZMLIDL,DRIDL
250016      C     /IDLEQ3/ UTIDOF
250017      C     /OPMOD1/ BFRCOF,BFSTEP,BFR50K
250018      C     /OPMOD2/ MYSTEP
250019      C     /REGION/ IREJN
250020      C     /TAMID3/ OFFIDL
250021      C
250022      C Output on return:
250023      C
250024      C     function: BEFIDL
250025      C
250026      C Local array subscripts:
250027      C
250028      C CHGHRS(4) - CHGHRS ( IVREV )
250029      C COLIM(14) - COLIM ( IGUTIO )
250030      C D50 (3) - D50 ( 123F )
250031      C DBF (3) - DBF ( 123F )
250032      C IDLREV(4) - IDLREV ( IVREV )
250033      C MTHIDL(2) - MTHIDL ( IRJN )
250034      C ZBF (3) - ZBF ( 123F )
250035      C
250036      C Local variable dictionary:
250037      C
250038      C      Name      Type      Description
250039      C      -----
250040      C BER          R      untampered basic emission rate
250041      C BFGT50       R      mileage greater than 50,000 (BFMILE=6.0 -> BFGT50=1.0)
250042      C BFMILE      R      cumulative mileage in ICY for IV from MY
250043      C              scaled by 10**4
250044      C COLIM        R      CO Idle EF LBs for each IGUTIO MYG; keeps low vmt cases >0.0
250045      C D50          R      BF deterioration rate for beyond 50K miles
250046      C DBF          R      BF deterioration rate for the first 50K miles
250047      C 123F         I      index for Bag 2 (=1), Bag 3 (=2), and FTP (=3)
250048      C IB          I      index for Bag 1 (=1), Bag 2 (=2), Bag 3 (=3),
250049      C              and FTP (=4)
250050      C IBFSW        I      see parameter dictionary
250051      C IDLREV        I      lower bound MYs of REVISED IDLe EF calculation algorithm MYGs
250052      C IGUTIO        I      model year index for untampered idle offsets (UTIDOF),
250053      C              =1 for 1979-, =2 for 1980, ..., =14 for 1992+
250054      C CREDIM        R      I/M adjustment to idle emission factor
250055      C IVVT          I      index for LDGV (=1) and LDGT1/2 (=2)
250056      C MTHIDL        R      methane offset to idle EF in gph (assumes methane is approx.
250057      C              6% of total HC over the affected MY range for Bags 2 & 3)

```


Appendix C: MOBILE4 Function BEFIDL

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```

250058 C OMCFF R operating mode correction factor at FTP
250059 C conditions
250060 C OMCFH R operating mode correction factor at Hot FTP
250061 C conditions
250062 C RATIO R ratio of OMCF at Hot FTP to OMCF at FTP
250063 C CHGHR5 R factor for converting BER units from gpm to gph = FTP standard
250064 C speed for IVREV (BER is returned from BEF uncorrected =
250065 C assumes FTP conditions)
250066 C ZBF R BF zero mile level
250067 C
250068 C Notes:
250069 C
250070 C BEFIDL and its associated BLOCK DATA (03 & 05) have been extensively
250071 C revised for MOBILE4.
250072 C
250073 C
250074 C INTEGER PRTFLG,HCFLAG
250075 C
250076 C COMMON /BASEQ6/ MYGERU(12,2,3,8,2),MAXERU,NUMERU(3,8,2),KEYER,IGER
250077 C COMMON /CUMCOM/ CUMMIL(20,8)
250078 C COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
250079 C COMMON /IDLEQ1/ ZMLIDL(15,3,8,2),DRIDL(15,3,8,2)
250080 C COMMON /IDLEQ3/ UTIDOF(14,3,2)
250081 C COMMON /OPMOD1/ BFRCOF(8,8,3,6),BFSTEP(8,12,3,3),BFR5OK(4,12,3)
250082 C COMMON /OPMOD2/ MYSTEP,MAXBFR,MYGBFR(8,3,6)
250083 C COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
250084 C COMMON /TAMID3/ OFFIDL(3,20,4)
250085 C
250086 C DIMENSION IDLREV(4),DBF(3),ZBF(3),D50(3),CHGHR5(4),COLIM(14)
250087 C REAL MTHIDL(2)
250088 C
250089 C DATA IDLREV/1977,1979,1979,1984/
250090 C DATA MTHIDL/0.9,1.5/,CHGHR5/19.6,19.6,19.6,20.0/
250091 C DATA COLIM/303.37,56.71,22.56,25.63,35.17,30.36,31.77,
250092 C * 26.23,25.08,24.07,23.71,23.24,22.38,21.78/
250093 C
250094 C If the passed in pollutant x vehicle class x altitude case has one or more
250095 C sets of replacement BEF equation coefficients, the idle emission factor
250096 C is returned as zero. Note: IF ((ICY-IDLREV(IVLDG)+1).GE.20) THEN all MYs of
250097 C ICY's 20 MY window use the revised idle algorithm. If this algorithm can
250098 C be shown to handle NEWFLG, then compute an idle ef for ICYs passing the IF.
250099 C
250100 C BEFIDL=0.0
250101 C IF (NUMERU(IP,IV,IREJN).GE.1) RETURN
250102 C
250103 C Assign ICY and determine the I/M credit.
250104 C
250105 C ICY=MY-IDX+20
250106 C CREDIM=PCLEFT(MY,ICY,IP,IV)
250107 C
250108 C In some MY cases use the MOBILE4 revised idle EF calculation algorithm.
250109 C
250110 C IF (IV.GE.5) GOTO 10
250111 C IF (MY.GE.IDLREV(IV).AND.IP.LE.2) GOTO 20
250112 C IF (MY.GE.IDLREV(IV).AND.IP.EQ.3) GOTO 60
250113 C
250114 C Compute base idle emission factor and then make corrections for
250115 C inspection maintenance, tampering offset and methane offset.

```

Appendix C: MOBILE4 Function BEFIDL

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```

250116 C I/M Programs will not produce a large enough total HC reduction to lead to
250117 C a negative result when the relatively small methane offset is subtracted.
250118 C
250119 10 IGIDL=IDLPTR(MY,IP,IV)
250120 BEFIDL=(ZMLIDL(IGIDL,IP,IV,IREJN)
250121 * +DRIDL(IGIDL,IP,IV,IREJN)*VMTAGE)*CREDIM
250122 C
250123 IF(IV.GE.5.AND.IV.LE.7) RETURN
250124 IF(IP.EQ.1.AND.NMHFLG.EQ.2) BEFIDL=BEFIDL-MTHIDL(IREJN)
250125 IF(IV.NE.8) BEFIDL=BEFIDL+OFFIDL(IP,IDX,IV)
250126 C
250127 RETURN
250128 C
250129 C Revised HC & CO calculation algorithm case:
250130 C
250131 C Obtain an untampered BER by using BEF with IBEFSW=1.
250132 C
250133 20 IBEFSW=1
250134 IVI=IV
250135 IF(IV.EQ.4) IVI=IVI-1
250136 BER=BEF(MY,IDX,ICY,IP,IVI,VMTAGE,IBEFSW)
250137 C
250138 C Set up various BF pointers and mileage values.
250139 C
250140 MYSTEP=2
250141 IF(MY.LT.1981.OR.(MY.LT.1984.AND.IVI.GT.1)) MYSTEP=1
250142 IGBF=IBFPTR(MY,IP,IVI)
250143 JDX=21-IDX
250144 C
250145 DO 25 123F=1,3
250146 D50(123F)=0.0
250147 25 CONTINUE
250148 C
250149 BFMILE=CUMMIL(JDX,IVI)*.0001
250150 BFGT50=0.0
250151 C
250152 C Determine Bag Fraction coefficients for Bag 2, Bag 3, and FTP.
250153 C Use appropriate coefficients for 1981+ LDGV and 1984+ LDGT1/2.
250154 C
250155 IF((IVI.EQ.1.AND.MY.GE.1981).OR.(IVI.GE.2.AND.MY.GE.1984))
250156 * GOTO 35
250157 C
250158 DO 30 123F=1,3
250159 IB=123F*2+2
250160 ZBF(123F)=BFRCOF(IB-1,IGBF,IP,IVI)
250161 DBF(123F)=BFRCOF(IB,IGBF,IP,IVI)
250162 30 CONTINUE
250163 GOTO 45
250164 C
250165 35 DO 40 123F=1,3
250166 IB=123F*2+2
250167 ZBF(123F)=BFSTEP(IB-1,IGBF,IP,IVI)
250168 DBF(123F)=BFSTEP(IB,IGBF,IP,IVI)
250169 40 CONTINUE
250170 C
250171 C Use kinked Bag Fractions for 1981+ LDGV if mileage is above 50,000.
250172 C
250173 45 IF(IVI.NE.1.OR.MY.LT.1981.OR.BFMILE.LE.5.0) GOTO 55

```

Appendix C: MOBILE4 Function BEFIDL

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```

250174 C
250175 DO 50 I23F=1,3
250176 IB=I23F+1
250177 D50(I23F)=BFR50K(IB,IGBF,IP)
250178 50 CONTINUE
250179 C
250180 BFGT50=BFMILE-5.0
250181 BFMILE=5.0
250182 C
250183 C Compute OMCFF at FTP and OMCFF at Hot FTP. Hot FTP is split between hot
250184 C stabilized (.521) and hot start (.479) operating conditions.
250185 C
250186 55 OMCFF=ZBF(3)+DBF(3)*BFMILE+D50(3)*BFGT50
250187 C
250188 OMCFFH=0.521*(ZBF(1)+DBF(1)*BFMILE+D50(1)*BFGT50)
250189 * +0.479*(ZBF(2)+DBF(2)*BFMILE+D50(2)*BFGT50)
250190 C
250191 C Compute the ratio of OMCFF at Hot FTP to OMCFF at FTP.
250192 C
250193 RATIO=OMCFFH/OMCFF
250194 C
250195 C Convert the uncorrected (FTP conditions) exhaust ER from gpm to gph and then
250196 C adjust for no cold start component (idle occurs under Hot FTP conditions).
250197 C
250198 BEFIDL=BER*CHGHR5(IV)*RATIO
250199 C
250200 C Add the displacement (BER's Det rate * FTP speed) to the idle curve. Note
250201 C that the user entered scenario operating mode mix does not affect idle EF.
250202 C Also, HDGV is a special case, using LDGT2's BER & RATIO and here a simpler
250203 C displacement data structure. For NOx, assign the hardcoded average value.
250204 C
250205 60 IF(IV.LT.4) GOTO 70
250206 IF(IP.EQ.1.AND.MY.GE.1986) BEFIDL=BEFIDL+1.28
250207 IF(IP.EQ.2.AND.MY.LE.1985) BEFIDL=BEFIDL-22.88
250208 IF(IP.EQ.3.AND.MY.LE.1985) BEFIDL=7.11
250209 IF(IP.EQ.3.AND.MY.GE.1986) BEFIDL=2.35
250210 GOTO 80
250211 C
250212 C Identify the pointers and lookup & add in the UnTampered IDle Offset.
250213 C
250214 70 IGUTIO=MY-1978
250215 IF(IGUTIO.LT.1) IGUTIO=1
250216 IF(IGUTIO.GT.14) IGUTIO=14
250217 IVVT=IV
250218 IF(IV.EQ.3) IVVT=2
250219 IF(IP.EQ.3) BEFIDL=0.0
250220 BEFIDL=BEFIDL+UTIDOF(IGUTIO,IP,IVVT)
250221 C
250222 C If LDGV, raise low VMT CO cases (which can go negative by using the curve)
250223 C to an average (by the low end data) value.
250224 C
250225 IF(IV.EQ.1.AND.IP.EQ.2.AND.IREJN.EQ.1)
250226 * BEFIDL=AMAX1(BEFIDL,COLIM(IGUTIO))
250227 IF(IV.EQ.1.AND.IP.EQ.2.AND.IREJN.EQ.2)
250228 * BEFIDL=AMAX1(BEFIDL,COLIM(IGUTIO)*1.17)
250229 C
250230 C Apply the I/M credit (for NOx always 1.0), add in the tampering offset and,
250231 C if HC and a nonmethane HC only run, subtract off methane.

```

Appendix C: MOBILE4 Function BEFIDL

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```
250232 C
250233 80 BEFIDL=BEFIDL*CREDIM
250234 BEFIDL=BEFIDL+OFFIDL(IP,IDX,IV)
250235 IF(IP.EQ.1.AND.NMHFLG.EQ.2) BEFIDL=BEFIDL-MTHIDL(IREJN)
250236 C
250237 RETURN
250238 END
```

```
301000      FUNCTION IGEPTR(MY,IVA)
301001      C
301002      C IGEPTR selects the pointer to the fraction of vehicles equipped with a/c.
301003      C
301004      C Called by BIGALH.
301005      C
301006      C Calls QUITER.
301007      C
301008      C Input on call:
301009      C
301010      C   parameter list: MY,IVA
301011      C   common blocks:
301012      C   /ALUPAC/ MYGACE
301013      C   /REGION/ IREJN
301014      C
301015      C Output on return:
301016      C
301017      C   function: IGEPTR
301018      C
301019      C Notes:
301020      C
301021      C   none
301022      C
301023      C
301024      C   COMMON /ALUPAC/ MYGACE(8,3,2),MYGACC(2,3,2)
301025      C   COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
301026      C
301027      C   DO 10 IG=1,8
301028      C   IF (MY.LE.MYGACE(IG,IVA,IREJN)) GOTO 20
301029      C 10 CONTINUE
301030      C
301031      C Set default.
301032      C
301033      C   IG=1
301034      C   CALL QUITER(0.,6,61,MY)
301035      C 20 IGEPTR=IG
301036      C
301037      C   RETURN
301038      C   END
```


Appendix C: MOBILE4 Function IGUPTR

May 5, 1989

```
302000      FUNCTION IGUPTR(MY,IVA)
302001      C
302002      C  IGUPTR selects the pointer to the fraction of vehicles using a/c.
302003      C
302004      C  Called by BIGALH.
302005      C
302006      C  Calls QUITER.
302007      C
302008      C  Input on call:
302009      C
302010      C      parameter list: MY,IVA
302011      C      common blocks:
302012      C      /ALUPAC/ MYGACC
302013      C      /REGION/ IREJN
302014      C
302015      C  Output on return:
302016      C
302017      C      function: IGUPTR
302018      C
302019      C  Notes:
302020      C
302021      C  none
302022      C
302023      C
302024      C      COMMON /ALUPAC/ MYGACC(8,3,2),MYGACC(2,3,2)
302025      C      COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
302026      C
302027      C      DO 10 IG=1,2
302028      C      IF (MY.LE.MYGACC(IG,IVA,IREJN)) GOTO 20
302029      C      10 CONTINUE
302030      C
302031      C  Set default.
302032      C
302033      C      IG=1
302034      C      CALL QUITER(0.,7.61,MY)
302035      C      20 IGUPTR=IG
302036      C
302037      C      RETURN
302038      C      END
```

Appendix C: MOBILE4 Function IGLPTR

May 5, 1989

```
303000      FUNCTION IGLPTR(MY,IVA)
303001      C
303002      C IGLPTR selects the pointer to the fraction of vehicles with extra load.
303003      C
303004      C Called by BIGALH.
303005      C
303006      C Calls QUITER.
303007      C
303008      C Input on call:
303009      C
303010      C   parameter list: MY,IVA
303011      C   common blocks:
303012      C   /ALUPLT/ MYGXLC
303013      C   /REGION/ IREJN
303014      C
303015      C Output on return:
303016      C
303017      C   function: IGLPTR
303018      C
303019      C Notes:
303020      C
303021      C none
303022      C
303023      C
303024      C   COMMON /ALUPLT/ MYGXLC(6,3,2),MYGTWC(6,3,2)
303025      C   COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
303026      C
303027      C   DO 10 IG=1,6
303028      C   IF(MY.LE.MYGXLC(IG,IVA,IREJN)) GOTO 20
303029      C 10 CONTINUE
303030      C
303031      C Set default.
303032      C
303033      C   IG=1
303034      C   CALL QUITER(0.,8,61,MY)
303035      C 20 IGLPTR=IG
303036      C
303037      C   RETURN
303038      C   END
```

Appendix C: MOBILE4 Function IGTPTN

May 5, 1989

```
304000      FUNCTION IGTPTN(MY,IVA)
304001      C
304002      C IGTPTN selects the pointer to the fraction of vehicles with trailer in tow.
304003      C
304004      C Called by BIGALH.
304005      C
304006      C Calls QUITER.
304007      C
304008      C Input on call:
304009      C
304010      C   parameter list: MY,IVA
304011      C   common blocks:
304012      C   /ALUPLT/ MYGTWC
304013      C   /REGION/ IREJN
304014      C
304015      C Output on return:
304016      C
304017      C   function: IGTPTN
304018      C
304019      C Notes:
304020      C
304021      C none
304022      C
304023      C
304024      COMMON /ALUPLT/ MYGXLC(6,3,2),MYGTWC(6,3,2)
304025      COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
304026      C
304027      DO 10 IG=1,6
304028      IF (MY.LE.MYGTWC(IG,IVA,IREJN)) GOTO 20
304029      10 CONTINUE
304030      C
304031      C Set default.
304032      C
304033      IG=1
304034      CALL QUITER(0.,9,61,MY)
304035      20 IGTPTN=IG
304036      C
304037      RETURN
304038      END
```

Appendix C: MOBILE4 Function IBFPTR

May 5, 1989

```

305000      FUNCTION IBFPTR(MY,IP,IVLM)
305001      C
305002      C IBFPTR selects the pointer to the normalized bag fractions in BFSTEP and
305003      C BFR50K (if 1981+ LDGV) or in BFRCOF (all other MY x IVLM cases).
305004      C
305005      C Called by BIGIN2 and BEFIDL.
305006      C
305007      C Calls QUITER.
305008      C
305009      C Input on call:
305010      C
305011      C   parameter list: MY,IP,IVLM
305012      C   common blocks:
305013      C   /OPMOD2/ MYSTEP,MAXBFR,MYGBFR
305014      C
305015      C Output on return:
305016      C
305017      C   function: IBFPTR
305018      C
305019      C Notes:
305020      C
305021      C IBFPTR was modified for MOBILE4.
305022      C
305023      C
305024      C   COMMON /OPMOD2/ MYSTEP,MAXBFR,MYGBFR(8,3,6)
305025      C
305026      C   IF (MYSTEP.EQ.2) GOTO 20
305027      C
305028      C   DO 10 IG=1,MAXBFR
305029      C   IF (MY.LE.MYGBFR(IG,IP,IVLM)) GOTO 30
305030      C   10 CONTINUE
305031      C
305032      C   Set default.
305033      C
305034      C   IG=1
305035      C   CALL QUITER(0.,10,61,MY)
305036      C   GOTO 30
305037      C
305038      C 1981+ LDGV case: coefficients change every year 1981 through 1992.
305039      C 1984+ LDGT1/2 case: coefficients change every year 1984 through 1992.
305040      C 1993 - 2020 are same as 1992's. Figure index accordingly.
305041      C
305042      C 20 IF (MY.LE.1992) IG=MY-1981+1
305043      C   IF (MY.GE.1993) IG=12
305044      C
305045      C 30 IBFPTR=IG
305046      C
305047      C   RETURN
305048      C   END

```

Appendix C: MOBILE4 Subroutine IERPTR

May 5, 1989

```

306000      SUBROUTINE IERPTR(MY,IP,IV)
306001      C
306002      C IERPTR selects the array pair and the model year group pointers into the
306003      C intercept and slope arrays for the FTP emission rate equations.
306004      C
306005      C Called by BEF.
306006      C
306007      C Calls QUITER.
306008      C
306009      C Input on call:
306010      C
306011      C   parameter list: MY,IP,IV
306012      C   common blocks:
306013      C   /BASEQ2/ MYGERB,MAXERB
306014      C   /BASEQ6/ MYGERU,NUMERU
306015      C   /FLAGS2/ NEWFLG
306016      C   /REJN/ IREJN
306017      C
306018      C Output on return:
306019      C
306020      C   common block: /BASEQ6/ KEYER,IGER
306021      C
306022      C Notes:
306023      C
306024      C STOREQ modified in MOBILE4 to look for the match in first the user
306025      C supplied and then the hardcoded equation myg arrays.
306026      C
306027      C The user is responsible for insuring entered ER records do not have
306028      C overlapping mygs. IERPTR returns the index to the first myg match.
306029      C
306030      C
306031      C   INTEGER ALHFLG
306032      C
306033      C   COMMON /BASEQ2/ MYGERB(20,3,8,2),MAXERB
306034      C   COMMON /BASEQ6/ MYGERU(12,2,3,8,2),MAXERU,NUMERU(3,8,2),KEYER,IGER
306035      C   COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
306036      C   COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
306037      C
306038      C   IF(NEWFLG.EQ.1.OR.NUMERU(IP,IV,IREJN).EQ.0) GOTO 20
306039      C
306040      C   Might be a match in the user supplied myg's.
306041      C
306042      C   KEYER=2
306043      C   DO 10 IGER=1,MAXERU
306044      C   IF(MY.GE.MYGERU(IGER,1,IP,IV,IREJN).AND.
306045      C   * MY.LE.MYGERU(IGER,2,IP,IV,IREJN)) GOTO 90
306046      C   10 CONTINUE
306047      C
306048      C   Look in the Block Data hardcoded myg's.
306049      C
306050      C   20 KEYER=1
306051      C   DO 30 IGER=1,MAXERB
306052      C   IF(MY.LE.MYGERB(IGER,IP,IV,IREJN)) GOTO 90
306053      C   30 CONTINUE
306054      C
306055      C   Set default.
306056      C
306057      C   IGER=1

```


Appendix C: MOBILE4 Subroutine IERPTR

May 5, 1989

```
306058      CALL QUITER(0.,11,61,MY)
306059      C
306060      90 RETURN
306061      END
```

Appendix C: MOBILE4 Function ISPPTR

May 5, 1989

```

307000      FUNCTION ISPPTR(MY,IP,IV,ICASE)
307001      C
307002      C   ISPPTR selects the pointer to the bag speed normalization coefficients in
307003      C   arrays SK1/SK2C/SKG/SK2N & the scf's in SCUNAI for LDGV, LDGT1, LDGT2 & MC.
307004      C
307005      C   Called by BIGCFX and BIGSAL.
307006      C
307007      C   Calls QUITER.
307008      C
307009      C   Input on call:
307010      C
307011      C       parameter list: MY,IP,IV,ICASE
307012      C       common blocks:
307013      C       /REGION/ IREJN
307014      C       /SPEED2/ MYGSP1,MYGSMC,MYGSP2
307015      C       /SPEED4/ MAXSP1,LBLAST
307016      C       /SPEED5/ MYHSPC,MAXHSP
307017      C
307018      C   Output on return:
307019      C
307020      C       function: ISPPTR
307021      C
307022      C   Local variable / array dictionary:
307023      C
307024      C       Name      Type      Description
307025      C       -----
307026      C       IUB1ST    I         Upper Bound my of 1ST myg of new LDGV/T equation case
307027      C
307028      C   Notes:
307029      C
307030      C   Error code 61 causes QUITER to print an error message referencing the
307031      C   calling pointer function and the failure to find a myg pointer. QUITER
307032      C   then stops execution. Hence, control never returns to the calling function.
307033      C   No explicit branch after the call out of the function is needed.
307034      C
307035      C   ISPPTR was modified for MOBILE4 by merging in ISPPT8 and adding case 3.
307036      C   ISPPTR was modified for MOBILE4 to change the new LDGV/T equation case.
307037      C
307038      C
307039      C       COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
307040      C       COMMON /SPEED2/ MYGSP1(18,2,3),MYGSMC(18,2,3),MYGSP2(3,3)
307041      C       COMMON /SPEED4/ MAXSP1,LB1STS(3),LBLAST,IVB,IVA
307042      C       COMMON /SPEED5/ MYHSPC(2,3),MAXHSP(3)
307043      C
307044      C   Branch to myg index array lookup for the scf coefficients case requested.
307045      C
307046      C       GOTO(10,20,30,40),ICASE
307047      C
307048      C   Case 1: "Old" (= Not changed since MOBILE2) scf coefficients for the fifth
307049      C       degree polynomial equation for LDGV/T. These are dependent on the
307050      C       my, altitude and vehicle class.
307051      C
307052      C       10 DO 15 IG=1,MAXSP1
307053      C           IF (MY.LE.MYGSP1(IG,IREJN,IV)) GOTO 90
307054      C       15 CONTINUE
307055      C
307056      C       IG=1
307057      C       CALL QUITER(0.,12,61,MY)

```

Appendix C: MOBILE4 Function ISPPTR

May 5, 1989

```

307058 C
307059 C Case 2: "Old" (= Not changed since MOBILE2) scf coefficients for MC.
307060 C     These are dependent on the my, altitude and pollutant type.
307061 C
307062 C 20 DO 25 IG=1,MAXSPI
307063 C     IF (MY.LE.MYGSMC(IG,IREJN,IP)) GOTO 90
307064 C 25 CONTINUE
307065 C
307066 C     IG=1
307067 C     CALL QUITER(0.,13,61,MY)
307068 C
307069 C Case 3: coefficients for new for MOBILE4 A/X+B & A+B*X+C*X**2 scf equations.
307070 C     for LDGV/T. These are dependent on my, pollutant type and vehicle
307071 C     class.
307072 C
307073 C 30 IUBIST=MYGSP2(IP,IV)
307074 C     IF (MY.LE.IUBIST) IG=1
307075 C     IF (MY.GT.IUBIST.AND.MY.LE.LBLAST) IG=MY-IUBIST+1
307076 C     IF (MY.GT.LBLAST) IG=LBLAST-IUBIST+1
307077 C     GOTO 90
307078 C
307079 C Case 4: Subcase of 3 - a different set of A/X + B coefficients is used
307080 C     when the inputted speed exceeds FTP speed, the pollutant is HC or CO,
307081 C     the vehicle type is LDGV/T and the my is at or beyond a specified
307082 C     year. This second set of new coefficients vary with my and iv.
307083 C
307084 C 40 IG=MY-MYHSPC(1,IV)+1
307085 C     IF (MY.GT.MYHSPC(2,IV)) IG=MAXHSP(IV)
307086 C
307087 C Assign the myg cell pointer.
307088 C
307089 C 90 ISPPTR=IG
307090 C
307091 C     RETURN
307092 C     END

```

Appendix C: MOBILE4 Subroutine EXMPTR

May 5, 1989

```

308000      SUBROUTINE EXMPTR(MY,IV)
308001      C
308002      C EXMPTR selects the pointer to the non-methane fractions.
308003      C
308004      C Called by BIGCFX.
308005      C
308006      C Calls QUITER.
308007      C
308008      C Input on call:
308009      C
308010      C   parameter list: MY,IV
308011      C   common blocks:
308012      C   /NMETH1/ MYGEXM,LBEXM
308013      C   /REGION/ IREJN
308014      C
308015      C Output on return:
308016      C
308017      C   common block: /NMETH2/ IEXMYG,IEXARR
308018      C
308019      C Notes:
308020      C
308021      C EXMPTR replaces MOBILE3's IEXMPT, returning array selection key IEXARR,
308022      C as well as myg index IEXMYG.
308023      C EXMPTR was modified in MOBILE4 to allow high altitude LDGV/T cases to use
308024      C the IEXARR=2 pointer assignment algorithm.
308025      C
308026      C EXMPTR was modified for MOBILE4.
308027      C
308028      C
308029      COMMON /NMETH1/ EXMET1(3,6,8,2),MYGEXM(6,8,2),EXMET2(3,10,3),LBEXM
308030      COMMON /NMETH2/ IEXMYG,IEXARR
308031      COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
308032      C
308033      IEXARR=1
308034      DO 10 IG=1,6
308035      IF (MY.LE.MYGEXM(IG,IV,IREJN)) GOTO 30
308036      10 CONTINUE
308037      IF (IV.LE.3) GOTO 20
308038      C
308039      C Set default.
308040      C
308041      IG=1
308042      CALL QUITER(0.,14,61,MY)
308043      C
308044      C Low alt LDGV/T have mygs 7+ in 1 year increments for lookup in EXMET2.
308045      C Hence, index(7+) = MY - myg6 ub, for MY up to LBEXM (currently 1990).
308046      C
308047      20 IEXARR=2
308048      IG=IG-1
308049      IF (MY.LT.LBEXM) IG=MY-MYGEXM(IG,IV,IREJN)
308050      IF (MY.GE.LBEXM) IG=LBEXM-MYGEXM(IG,IV,IREJN)
308051      C
308052      30 IEXMYG=IG
308053      C
308054      RETURN
308055      END

```

```
309000      FUNCTION ITCPTR(MY,IP,IVTEMP)
309001      C
309002      C ITCPTR selects the pointer to the temperature correction coefficients.
309003      C
309004      C Called by BIGCFX.
309005      C
309006      C Calls QUITER.
309007      C
309008      C Input on call:
309009      C
309010      C   parameter list: MY,IP,IVTEMP
309011      C   common block: /TEMPC2/ MAXTCF,MYGTCF
309012      C
309013      C Output on return:
309014      C
309015      C   function: ITCPTR
309016      C
309017      C Notes:
309018      C
309019      C none
309020      C
309021      C
309022      C   COMMON /TEMPC2/ MAXTCF,MYGTCF(9,3,5),MYGTFD(3),ISHIFT
309023      C
309024      C   DO 10 IG=1,MAXTCF
309025      C   IF (MY.LE.MYGTCF(IG,IP,IVTEMP)) GOTO 20
309026      C 10 CONTINUE
309027      C
309028      C Set default.
309029      C
309030      C   IG=1
309031      C   CALL QUITER(0.,15,61,MY)
309032      C 20 ITCPTR=IG
309033      C
309034      C   RETURN
309035      C   END
```



```
310000      FUNCTION IGSFPT(MY,IV)
310001      C
310002      C IGSFPT selects the pointer to the gas/diesel sales fractions.
310003      C
310004      C Called by EFCALX, IDLCAL, HCCALX and REGMOD.
310005      C
310006      C Calls QUITER.
310007      C
310008      C Input on call:
310009      C
310010      C     parameter list: MY,IV
310011      C     common blocks:
310012      C     /GSFCOM/ MAXGSF,MYGSF
310013      C     /REGION/ IREJN
310014      C
310015      C Output on return:
310016      C
310017      C     function: IGSFPT
310018      C
310019      C Notes:
310020      C
310021      C none
310022      C
310023      C
310024      C     COMMON /GSFCOM/ MAXGSF,GSFRAC(22,8,2),MYGSF(22,8,2)
310025      C     COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
310026      C
310027      C     DO 10 IG=1,MAXGSF
310028      C     IF (MY.LE.MYGSF(IG,IV,IREJN)) GOTO 20
310029      C 10 CONTINUE
310030      C
310031      C Set default for case where MY exceeds highest yr in MYGSF, given IV & IREJN.
310032      C
310033      C     IG=1
310034      C     CALL QUITER(0.,16,61,MY)
310035      C 20 IGSFPT=IG
310036      C
310037      C     RETURN
310038      C     END
```

```

311000      FUNCTION ITAMPT(ICASE)
311001      C
311002      C   ITAMPT returns the pointer to the model year group cell location holding
311003      C   the desired data point, given MY. ICASE identifies the calling CSECT
311004      C   location and hence the array to be indexed and thus the my groups array
311005      C   to search for the pointer. Only tampering subroutines use this function.
311006      C
311007      C   Called by EFFGRP, EMIRAT and EVPEME.
311008      C
311009      C   Input on call:
311010      C
311011      C       parameter list: ICASE
311012      C       common blocks:
311013      C       /LOOKUP/  IVTAM,IQG,IHG
311014      C       /MYCODE/  MY
311015      C       /MYUB1/   MYTGS,MYEGR,MYVTS
311016      C       /MYUB2/   MYCCEI
311017      C       /TAMID2/ MYIDLE,IEK
311018      C
311019      C   Output on return:
311020      C
311021      C       function: ITAMPT
311022      C
311023      C   Notes:
311024      C
311025      C   Differences from the other pointer functions:
311026      C   (1) 5 different my group arrays are handled by this 1 subroutine, instead
311027      C       of having a separate function for each case.
311028      C   (2) ITAMPT assumes no default value, as the others do. I.e. the typical
311029      C       code:
311030      C           C
311031      C           C..Set default
311032      C           C
311033      C           IG=1
311034      C           CALL QUITER(0.,6,61,MY)
311035      C       is not inserted after each search loop. All the my arrays have 2020,
311036      C       the highest ICY allowed by subroutine input, as the last non-dummy
311037      C       upper bound. Hence, an in-range match has to occur.
311038      C
311039      C   ITAMPT was modified for MOBILE4.
311040      C
311041      C       COMMON /LOOKUP/  IVTAM,IQG,IPG,JPGD,IHG,IGCSF
311042      C       COMMON /MYCODE/  MY,IDX,JDX,LDXSY,LMYVRT,IAY,IMDXSY,IMKINK
311043      C       COMMON /MYUB1/   MYTGS(11,6,4),MYEGR(4,4),MYVTS(3,2,4)
311044      C       COMMON /MYUB2/   MYCCEI(7,4)
311045      C       COMMON /TAMID2/  MYIDLE(3,3),IEK
311046      C
311047      C   Branch to array pointer loop being asked for by ICASE.
311048      C
311049      C       GOTO(10,20,30,40,50),ICASE
311050      C
311051      C   Case 1: find MY's cell in TGS.
311052      C
311053      C       10 DO 15 IG=1,11
311054      C           IF(MY.LE.MYTGS(IG,IQG,IVTAM)) GOTO 90
311055      C       15 CONTINUE
311056      C
311057      C   Case 2: find MY's cell in EMEGR.

```

Appendix C: MOBILE4 Function ITAMPT

May 5, 1989

```
311058 C
311059 20 DO 25 IG=1,4
311060     IF (MY.LE.MYEGR(IG,IVTAM)) GOTO 90
311061 25 CONTINUE
311062 C
311063 C Case 3: find MY's cell in EVPTGS.
311064 C
311065 30 DO 35 IG=1,3
311066     IF (MY.LE.MYVTS(IG,IHG,IVTAM)) GOTO 90
311067 35 CONTINUE
311068 C
311069 C Case 4: find MY's cell in CCEMI.
311070 C
311071 40 DO 45 IG=1,14
311072     IF (MY.LE.MYCCEI(IG,IVTAM)) GOTO 90
311073 45 CONTINUE
311074 C
311075 C Case 5: find MY's cell in TAMID2
311076 C
311077 50 DO 55 IG=1,3
311078     IF (MY.LE.MYIDLE(IG,IEK)) GOTO 90
311079 55 CONTINUE
311080 C
311081 C Assign cell number.
311082 C
311083 90 ITAMPT=IG
311084 C
311085     RETURN
311086     END
```

Appendix C: MOBILE4 Function IEVPTR

May 5, 1989

```

312000      FUNCTION IEVPTR(MY,KEYEQ,IVGAS,ICASE)
312001      C
312002      C IEVPTR selects pointers in support of evaporative hot soak / diurnal HC
312003      C calculations. Case 1 returns the emission standard subscript value.
312004      C Case 2 returns the pointer to the fraction of cars that are fuel
312005      C injected, given the model year.
312006      C
312007      C Called by DIURNL, HOTSOK.
312008      C
312009      C Calls QUITER.
312010      C
312011      C Input on call:
312012      C
312013      C   parameter list: MY,KEYEQ,IVGAS,ICASE
312014      C   common block:
312015      C   /EVAPAR/ IFDS
312016      C   /EVASTD/ MYGSTD,MAXSTD,KSTD81
312017      C   /INJECT/ MAXFIY,MINFIY
312018      C
312019      C Output on return:
312020      C
312021      C   function: IEVPTR
312022      C
312023      C Notes:
312024      C
312025      C In either Case, a default assignment is not included because there will
312026      C always be a match.
312027      C
312028      C IEVPTR was added for MOBILE4.
312029      C
312030      C
312031      COMMON /INJECT/ TBI(13,4),PFI(13,4),MAXFIY,MINFIY
312032      COMMON /EVAPAR/ IFDS,ISTDC,ISTDT,ISTDP,FINJ(2)
312033      COMMON /EVASTD/ MYGSTD(5,5),MAXSTD,KSTD81(4,3)
312034      C
312035      IF(ICASE.EQ.2) GOTO 60
312036      C
312037      C Select emission standard subscript value.
312038      C
312039      IF(KEYEQ.EQ.3) GOTO 50
312040      IF(MY.GE.1981.AND.IVGAS.LE.3) GOTO 50
312041      C
312042      C Untampered or uncontrolled subcase, with no fuel injection.
312043      C
312044      DO 20 IG=1,MAXSTD
312045      IF(MY.LE.MYGSTD(IG,IVGAS)) GOTO 80
312046      20 CONTINUE
312047      C
312048      C If execution reaches here, MY higher than MYGSTD(MAXSTD,IVGAS). BLOCK
312049      C DATA 09's initialization of MYGSTD needs to be corrected. Tell user
312050      C and stop execution within QUITER.
312051      C
312052      CALL QUITER(0.0,1.60,MY)
312053      C
312054      C If KEYEQ = 1,2: untampered or uncontrolled subcase, with fuel injection.
312055      C   or
312056      C If KEYEQ = 3 : certification fuel change subcase.
312057      C

```

Appendix C: MOBILE4 Function IEVPTR

May 5, 1989

```
312058      50 IG=KSTD81(IVGAS,IFDS)
312059          GOTO 80
312060      C
312061      C Select pointer to fuel injection (TBI & PFI) fractions.
312062      C
312063      60 IF (MY.LE.MINFIY) IG=1
312064          IF (MINFIY.LT.MY.AND.MY.LT.MAXFIY) IG=MY-MINFIY+1
312065          IF (MY.GE.MAXFIY) IG=MAXFIY-MINFIY+1
312066      C
312067      C Assign index number.
312068      C
312069      80 IEVPTR=IG
312070      C
312071      RETURN
312072      END
```


Appendix C: MOBILE4 Function IGRVPT

May 5, 1989

```
313000      FUNCTION IGRVPT(MY,IVTAM)
313001      C
313002      C   IGRVPT identifies the RVP CF MYG case.
313003      C
313004      C   Called by RVPEXH.
313005      C
313006      C   Input on call:
313007      C
313008      C       parameter list: MY,IVTAM
313009      C       common blocks:
313010      C       /RVPEX2/ MYGRVP
313011      C
313012      C   Output on return:
313013      C
313014      C       function: IGRVPT
313015      C
313016      C   Notes:
313017      C
313018      C   IGRVPT was added for MOBILE4.
313019      C
313020      C
313021      C       COMMON /RVPEX2/ MYGRVP(4,4),RVPCF(20,3,4,2),OPENCR
313022      C
313023      C       DO 10 IG=1,4
313024      C       IF(MY.LE.MYGRVP(IG,IVTAM)) GOTO 20
313025      C   10 CONTINUE
313026      C
313027      C   There is no "default" index value - MYGRVP is assumed to include for
313028      C   for each vehicle class an upper bound year = highest allowed as an
313029      C   evaluation year by MOBILE3 = 2020.
313030      C
313031      C   At the other extreme, there are no stored terms for the first model year
313032      C   group, since the correction factor for that group is a constant neutral
313033      C   1.0. Decrement IG so that IGRVPT correctly indexes the stored terms.
313034      C
313035      C   20 IGRVPT=IG-1
313036      C
313037      C       RETURN
313038      C       END
```

Appendix C: MOBILE4 Function IDLPTR

May 5, 1989

```
314000      FUNCTION IDLPTR(MY,IP,IV)
314001      C
314002      C IDLPTR selects the model year group pointer into the slope & intercept
314003      C arrays for the idle emission rate equation.
314004      C
314005      C Called by BEFIDL.
314006      C
314007      C Calls QUITER.
314008      C
314009      C Input on call:
314010      C
314011      C   parameter list: MY,IP,IV
314012      C   common blocks:
314013      C   /IDLEQ2/ MYGIDL,MAXIDL
314014      C   /REGION/ IREJN
314015      C
314016      C Output on return:
314017      C
314018      C   function: IDLPTR
314019      C
314020      C Notes:
314021      C
314022      C none
314023      C
314024      C
314025      COMMON /IDLEQ2/ MYGIDL(15,3,8,2),MAXIDL
314026      COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
314027      C
314028      DO 10 IG=1,MAXIDL
314029      IF (MY.LE.MYGIDL(IG,IP,IV,IREJN)) GOTO 20
314030      10 CONTINUE
314031      C
314032      C Set default.
314033      C
314034      IG=1
314035      CALL QUITER(0.,17,61,MY)
314036      C
314037      20 IDLPTR=IG
314038      RETURN
314039      END
```

Appendix C: MOBILE4 Function IMPTR

May 5, 1989

```

315000      FUNCTION IMPTR(MY,IV)
315001      C
315002      C IMPTR selects the emission control technology group pointer into the I/M
315003      C credits arrays for LDGV/T. In the case of TECH 4+, the returned value will
315004      C have to be decreased by 3 to properly index the TECH 4+ arrays.
315005      C
315006      C Called by PCLEFT.
315007      C
315008      C Input on call:
315009      C
315010      C   parameter list: MY,IV
315011      C   common block: /IMPAR5/ MYGIM2,LBIM4P
315012      C
315013      C Output on return:
315014      C
315015      C   function: IMPTR
315016      C
315017      C Notes:
315018      C
315019      C IMPTR was added for MOBILE4.
315020      C IMPTR was modified for MOBILE4 to account for the elimination of the
315021      C separate LDGT Tech 4+ I/M credits array.
315022      C
315023      C
315024      C   COMMON /IMPAR5/ MYGIM2(3,3),LBIM4P,CRHDTV(2,2),DISCNT(3)
315025      C
315026      C First check if Technology 1-2 case.
315027      C
315028      C   DO 10 IG=1,3
315029      C   IF(MY.LE.MYGIM2(IG,IV)) GOTO 20
315030      C   10 CONTINUE
315031      C
315032      C Technology 4+ case.
315033      C Add 3 to get relative slot (first Tech 4+ slot is 1 + 3 = 4th overall).
315034      C When used to index a Tech 4+ array, the 3 will be subtracted first.
315035      C Note that the MY to credit mapping differs between LDGV and LDGT, both
315036      C indexing the same array, but at different locations for a given MY.
315037      C
315038      C   IG=IG-1
315039      C   IF(MY.LT.LBIM4P) IG=MY-MYGIM2(IG,IV)+3
315040      C   IF(MY.GE.LBIM4P) IG=LBIM4P-MYGIM2(IG,IV)+3
315041      C   IF(IV.GE.2.AND.MY.GE.1988) IG=IG+3
315042      C
315043      C 20 IMPTR=IG
315044      C   RETURN
315045      C   END

```

Appendix C: MOBILE4 Function IRULPT

May 5, 1989

```
316000      FUNCTION IRULPT(MY,IVTL)
316001      C
316002      C  IRULPT selects the pointer to the running loss base emission rate for
316003      C  the given model year and vehicle class.
316004      C
316005      C  Called by RULOSS.
316006      C
316007      C  Calls QUITER.
316008      C
316009      C  Input on call:
316010      C
316011      C    parameter list: MY,IVTL
316012      C    common blocks:
316013      C    /RUNLS4/ MYGRUL,MAXRUL
316014      C
316015      C  Output on return:
316016      C
316017      C  function: IRULPT
316018      C
316019      C  Notes:
316020      C
316021      C  IRULPT was added for MOBILE4.
316022      C
316023      C
316024      C    COMMON /RUNLS4/ MYGRUL(4,4),MAXRUL
316025      C
316026      C    DO 10 IGTL=1,MAXRUL
316027      C    IF (MY.LE.MYGRUL(IGTL,IVTL)) GOTO 20
316028      C    10 CONTINUE
316029      C
316030      C  Set default.
316031      C
316032      C    IGTL=1
316033      C    CALL QUITER(0.,3,61,MY)
316034      C    20 IRULPT=IGTL
316035      C
316036      C    RETURN
316037      C    END
```

Appendix C: MOBILE4 Subroutine OUTPUT

May 5, 1989

```
401000      SUBROUTINE OUTPUT(ICY)
401001      C
401002      C OUTPUT writes scenario results on unit IOUREP.
401003      C
401004      C Called by MAIN.
401005      C
401006      C Calls OUTDT1, OUTDT2, OUTDT3, OUTDT4,
401007      C      OUTHD1, OUTHD2, OUTHD3 and OUTHD4.
401008      C
401009      C Input on call:
401010      C
401011      C      parameter list: ICY
401012      C      common blocks:
401013      C      /FLAGS3/ OUTFMT
401014      C      /REGION/ INITPR
401015      C
401016      C Notes:
401017      C
401018      C OUTPUT was modified in MOBILE4, removing the VIDLE zero out code.
401019      C
401020      C
401021      C      INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
401022      C
401023      C      COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
401024      C      COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
401025      C
401026      C Select report format.
401027      C
401028      C      GOTO(10,20,30,40),OUTFMT
401029      C
401030      C      OUTFMT=1
401031      C
401032      C      10 IF(INITPR.EQ.1) CALL OUTHD1
401033      C      CALL OUTDT1(ICY)
401034      C      GOTO 99
401035      C
401036      C      OUTFMT=2
401037      C
401038      C      20 IF(INITPR.EQ.1) CALL OUTHD2
401039      C      CALL OUTDT2(ICY)
401040      C      GOTO 99
401041      C
401042      C      OUTFMT=3
401043      C
401044      C      30 IF(INITPR.EQ.1) CALL OUTHD3
401045      C      CALL OUTDT3(ICY)
401046      C      GOTO 99
401047      C
401048      C      OUTFMT=4
401049      C
401050      C      40 IF(INITPR.EQ.1) CALL OUTHD4
401051      C      CALL OUTDT4(ICY)
401052      C
401053      C      99 RETURN
401054      C      END
```


Appendix C: MOBILE4 Subroutine OUTHD1

May 5, 1989

```

402000      SUBROUTINE OUTHD1
402001      C
402002      C OUTHD1 writes the run header on unit IOUREP using output format (OUTFMT) 1.
402003      C The format is intended for postprocessing of the data. Hence, the
402004      C header consists of the field descriptors of the data lines. Each scenario
402005      C generates 4 identically formatted lines, 1 each for evap HC, total HC,
402006      C CO and NOx. The evap HC line omits the last field (All Veh C.E.F.).
402007      C
402008      C Called by OUTPUT.
402009      C
402010      C Input on call:
402011      C
402012      C   common blocks:
402013      C   /IOUCOM/ IOUREP
402014      C   /MAXIMA/ MAXVEH
402015      C
402016      C Output on return:
402017      C
402018      C   common block: /REGION/ INITPR
402019      C
402020      C Local array dictionary:
402021      C
402022      C   Name      Type      Description
402023      C   -----
402024      C   NAMVEH     C*8      names of vehicle classes for field headings
402025      C
402026      C Notes:
402027      C
402028      C OUTFMT 1 contains the same set of fields as MOBILE3's OUTFMT 2, except that
402029      C
402030      C (1) The fields are all on 1 record, instead of split across 3 records,
402031      C     for a given scenario and pollutant. Field print order is the same.
402032      C
402033      C (2) The emission factors are printed with 3, instead of 2, decimal places.
402034      C
402035      C (3) The scenario id label (new for MOBILE4) is appended as the last field.
402036      C
402037      C OUTFMT 1 is the new "long" numeric format, with a record length of 212.
402038      C OUTHD1 was added for MOBILE4.
402039      C
402040      C
402041      COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
402042      COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
402043      COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
402044      C
402045      CHARACTER*8 NAMVEH(9)
402046      C
402047      DATA NAMVEH/
402048      *   'LDGV'  ',','LDGT1'  ',','LDGT2'  ',','LDGT'  ',','HDGV'  ', ',
402049      *   'LDDV'  ',','LDDT'  ',','HDDV'  ',','MC'   ', '/
402050      C
402051      INITPR=0
402052      C
402053      MAXV=MAXVEH+1
402054      WRITE (IOUREP,200)
402055      *   NAMVEH, (NAMVEH(IV),IV=1,3), (NAMVEH(IV),IV=5,MAXV)
402056      200 FORMAT (
402057      *   'O','R',73X,'P'/

```

Appendix C: MOBILE4 Subroutine OUTHD1

May 5, 1989

```
402058      *' ', 'e', 44X, 'Amb.', 20X, 'Alt. o', 28X, 'Composite Emission Factors',
402059      *          45X, 'Vehicle Mix' /
402060      *' ', 'g CY', 13X, 'Vehicle Speeds', 14X, 'Tmp Cold/Hot Start in Ft.'
402061      *          ' ', 9(3X, A5), ' All Veh', 8(1X, A5), ' Scenario Title' /
402062      *' ', ' - - ', 39(' - '), ' - - - ', 16(' - '), ' - - - - - ', 79(' - '), 1X,
402063      *          47(' - '), 1X, 16(' - '))
402064      C
402065      RETURN
402066      END
```

Appendix C: MOBILE4 Subroutine OUTHD2

May 5, 1989

```

403000      SUBROUTINE OUTHD2
403001      C
403002      C OUTHD2 writes the run header on unit IOUREP using output format (OUTFMT) 2.
403003      C The format is intended for postprocessing of the data. Hence, the
403004      C header consists of the field descriptors of the data lines. Each scenario
403005      C generates 4 identically formatted lines, 1 each for evap HC, total HC,
403006      C CO and NOx. The evap HC line prints blanks for the AllVeh C.E.F.
403007      C
403008      C Called by OUTPUT.
403009      C
403010      C Input on call:
403011      C
403012      C     common blocks:
403013      C     /IOUCOM/ IOUREP
403014      C     /MAXIMA/ MAXVEH
403015      C
403016      C Output on return:
403017      C
403018      C     common block: /REGION/ INITPR
403019      C
403020      C Local array dictionary:
403021      C
403022      C      Name      Type      Description
403023      C      -----
403024      C      NAMVEH    C*8      names of vehicle classes for field headings
403025      C
403026      C Notes:
403027      C
403028      C OUTFMT 2 contains the same set of fields as MOBILE3's OUTFMT 1, except that
403029      C
403030      C (1) The speed vector is omitted.
403031      C
403032      C (2) The emission factors and vmt mix fractions are printed for all vehicle
403033      C     classes are printed.
403034      C
403035      C New OUTFMT 1 is the new "short" numeric format. With a record length of
403036      C 130 columns, each record will fit entirely onto an output page without
403037      C truncation.
403038      C
403039      C OUTHD2 was added for MOBILE4.
403040      C
403041      C
403042      C     COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
403043      C     COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
403044      C     COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
403045      C
403046      C     CHARACTER*8 NAMVEH(9)
403047      C
403048      C     DATA NAMVEH/
403049      C     * 'LDGV'  ',','LDGT1'  ',','LDGT2'  ',','LDGT'  ',','HDGV'  ',
403050      C     * 'LDDV'  ',','LDDT'  ',','HDDV'  ',','MC'  ',','/'
403051      C
403052      C     INITPR=0
403053      C
403054      C     MAXV=MAXVEH+1
403055      C     WRITE (IOUREP,200)
403056      C     * NAMVEH, (NAMVEH(IV),IV=1,3), (NAMVEH(IV),IV=5,MAXV)
403057      C     200 FORMAT (

```


Appendix C: MOBILE4 Subroutine OUTHD3

May 5, 1989

```

404000      SUBROUTINE OUTHD3
404001      C
404002      C OUTHD3 writes the run header on unit IOUREP using output format (OUTFMT) 3.
404003      C The header consists of the run title and a partial echo of user selected
404004      C options and data.
404005      C
404006      C Called by OUTPUT.
404007      C
404008      C Calls OUTATP, OUTIMP, OUTLAP, OUTMTH, OUTNEW, OUTTAM and USDPTR.
404009      C
404010      C Input on call:
404011      C
404012      C   common blocks:
404013      C   /FLAGS1/ TAMFLG
404014      C   /FLAGS2/ NEWFLG,IMFLAG
404015      C   /FLAGS3/ ATPFLG
404016      C   /IOUCOM/ IOUREP
404017      C
404018      C Output on return:
404019      C
404020      C   common block: /REGION/ INITPR
404021      C
404022      C Notes:
404023      C
404024      C The call to TAMPER was commented out in MOBILE4.
404025      C
404026      C
404027      C   INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
404028      C   INTEGER ALHFLG
404029      C   INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
404030      C
404031      C   COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
404032      C   COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
404033      C   COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
404034      C   COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
404035      C   COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
404036      C
404037      C   INITPR=0
404038      C
404039      C   IF (TAMFLG.EQ.2) CALL OUTTAM
404040      C
404041      C   IF (NEWFLG.EQ.2) CALL OUTNEW
404042      C
404043      C   IF (IMFLAG.EQ.2) CALL OUTIMP
404044      C
404045      C   IF (ATPFLG.EQ.2) CALL OUTATP
404046      C
404047      C   IF (LOCFLG.EQ.2) CALL OUTLAP
404048      C
404049      C   CALL OUTMTH
404050      C
404051      C   WRITE (IOUREP,200)
404052      C   200 FORMAT('O',112(' '))
404053      C
404054      C   CALL USDPTR
404055      C
404056      C   RETURN
404057      C   END

```


Appendix C: MOBILE4 Subroutine OUTHD4

May 5, 1989

```

405000      SUBROUTINE OUTHD4
405001      C
405002      C OUTHD4 writes the run header on unit IOUREP using output format (OUTFMT) 4.
405003      C The header consists of the run title and a partial echo of user selected
405004      C options and data.
405005      C
405006      C Called by OUTPUT.
405007      C
405008      C Calls OUTATP, OUTIMP, OUTLAP, OUTMTH, OUTNEW, OUTTAM and USDPTR.
405009      C
405010      C Input on call:
405011      C
405012      C common blocks:
405013      C /FLAGS1/ TAMFLG
405014      C /FLAGS2/ NEWFLG,IMFLAG
405015      C /FLAGS3/ ATPFLG
405016      C /IOUCOM/ IOUREP
405017      C
405018      C Output on return:
405019      C
405020      C common block: /REGION/ INITPR
405021      C
405022      C Notes:
405023      C
405024      C The call to TAMPER was commented out in MOBILE4.
405025      C
405026      C
405027      C INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
405028      C INTEGER ALHFLG
405029      C INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
405030      C
405031      C COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
405032      C COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
405033      C COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
405034      C COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
405035      C COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
405036      C
405037      C INITPR=0
405038      C
405039      C IF (TAMFLG.EQ.2) CALL OUTTAM
405040      C
405041      C IF (NEWFLG.EQ.2) CALL OUTNEW
405042      C
405043      C IF (IMFLAG.EQ.2) CALL OUTIMP
405044      C
405045      C IF (ATPFLG.EQ.2) CALL OUTATP
405046      C
405047      C IF (LOCFLG.EQ.2) CALL OUTLAP
405048      C
405049      C CALL OUTMTH
405050      C
405051      C WRITE (IOUREP,200)
405052      C 200 FORMAT ('O',80(' '))
405053      C
405054      C CALL USDPTR
405055      C
405056      C RETURN
405057      C END

```

Appendix C: MOBILE4 Subroutine OUTHDR

May 5, 1989

```
406000      SUBROUTINE OUTHDR(10UOUT)
406001      C
406002      C OUTHDR writes the output header ( = run title ) on unit 10UOUT.
406003      C
406004      C Called by CONSEC.
406005      C
406006      C Input on call:
406007      C
406008      C   parameter list: 10UOUT
406009      C   common block: /PROJEC/ PROJID
406010      C
406011      C Notes:
406012      C
406013      C   none
406014      C
406015      C
406016      CHARACTER*4 PROJID
406017      COMMON /PROJEC/ PROJID(20)
406018      C
406019      WRITE(10UOUT,200) PROJID
406020      200 FORMAT('1',20A4)
406021      C
406022      RETURN
406023      END
```

Appendix C: MOBILE4 Subroutine OUTTAM

May 5, 1989

```

407000      SUBROUTINE OUTTAM
407001      C
407002      C OUTTAM prints the user supplied replacement tampering rates and the derived
407003      C TNKS = MISF - NCKS case in ID (instead of IDUSER) order. This routine is
407004      C calls are commented out in Release MOBILE4 and is used in-house for
407005      C diagnostic purposes only.
407006      C
407007      C Called by OUTHD3 and OUTHD4.
407008      C
407009      C Input on call:
407010      C
407011      C common blocks:
407012      C /FLAGS2/ IMFLAG
407013      C /FLAGS3/ OUTFMT
407014      C /IOUCOM/ IOUREP
407015      C /TAMEQ1/ TAMZML,TAMDR
407016      C
407017      C Local array subscripts:
407018      C
407019      C DISABL(2,9) - DISABL ( ICH , ID )
407020      C IGTYP(3,3) - IGTYP ( ITY , IGD )
407021      C IMTYP(3,2) - IMTYP ( ITY , IM )
407022      C USC(4) - USC ( ISC )
407023      C
407024      C Local variable / array dictionary:
407025      C
407026      C Name      Type      Description
407027      C -----
407028      C ADET      C*4      column heading for deterioration rates
407029      C AZML      C*4      column heading for zero mile levels
407030      C DISABL    C*8      names of disablement categories
407031      C IGTYP     C*4      tampering rates table headings, by myg & vmt, as applies
407032      C IMTYP     C*4      non-I/M and I/M tampering rates table headings
407033      C USC       C*4      underscore strings for table and column headings
407034      C
407035      C Notes:
407036      C
407037      C MOBILE4 prints two evaporative tampering categories (see ID definition).
407038      C
407039      C OUTTAM was modified for MOBILE4 to print 4's separate MYG2 >50K set.
407040      C
407041      C OUTTAM was modified for MOBILE4 to add the IGD dimension.
407042      C OUTTAM was modified for MOBILE4 for the new misfueling algorithm.
407043      C OUTTAM was commented out for MOBILE4.
407044      C For diagnostics and in-house use, OUTTAM will be kept up to date.
407045      C
407046      C
407047      C INTEGER ALHFLG
407048      C INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
407049      C COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
407050      C COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
407051      C COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
407052      C COMMON /TAMEQ1/ TAMZML(9,4,2,2),TAMDR(9,4,3,2),MYGTAM(4),IGT5,F50K
407053      C
407054      C CHARACTER*8 DISABL(2,9)
407055      C CHARACTER*4 IMTYP(3,2),IGTYP(3,3),AZML,ADET,USC(4)
407056      C
407057      C DATA IMTYP/'Non-','I/M ','Case',' I/','M Ca','se '/

```

Appendix C: MOBILE4 Subroutine OUTTAM

May 5, 1989

```

407058 DATA IGTYP/'MYG1','/A1',' VMT',
407059 * 'MYG2','/' <=',' 50K',
407060 * 'MYG2','/' >',' 50K'/
407061 DATA AZML/'ZML'//,ADET/'DET'//
407062 DATA USC/' ',' ',' ',' ',' ',' '
407063 DATA DISABL/'Air Pump',' ',' ',' '
407064 * 'Catalyst',' ',' '
407065 * 'Fuel Inl','et',' '
407066 * 'Other Mi','sfueling',' '
407067 * 'EGR Syst','em',' '
407068 * 'Evap Can','ister',' '
407069 * 'PCV Syst','em',' '
407070 * 'Cap',' ',' '
407071 * 'All Misf','ueling'/'
407072 C
407073 WRITE (IOUREP,200)
407074 200 FORMAT('O',
407075 * 'Replacement Tampering and Misfueling Rates Input by User:')
407076 C
407077 DO 20 IM=1,IMFLAG
407078 IF (OUTFMT.EQ.3) WRITE (IOUREP,210)
407079 * (IMTYPE (ITY,IM),ITY=1,3), (USC (4),ISC=1,3)
407080 210 FORMAT('O',T54,3A4/'+',T54,3A4)
407081 IF (OUTFMT.EQ.4) WRITE (IOUREP,220)
407082 * (IMTYPE (ITY,IM),ITY=1,3), (USC (4),ISC=1,3)
407083 220 FORMAT('O',T45,3A4/'+',T45,3A4)
407084 C
407085 DO 20 IGD=1,3
407086 IF (OUTFMT.EQ.4) GOTO 10
407087 C
407088 C Output Format 3: wide (112 column) descriptive layout:
407089 C
407090 WRITE (IOUREP,230)
407091 * (IGTYPE (ITY,IGD),ITY=1,3),
407092 * (USC (4),ISC=1,5), USC (1), USC (4), USC (1), USC (4)
407093 C
407094 230 FORMAT('O',T54,3A4/'+',T54,3A4/
407095 * 'O',T29,'LDGV',T48,'LDGT1',T67,'LDGT2',T86,'HDGV'/
407096 * '+',T29,A4,T48,2A4,T67,2A4,T86,A4)
407097 C
407098 IF (IGD.LE.2) WRITE (IOUREP,240)
407099 * (AZML,ADET,ITER=1,4),
407100 * (USC (4),ISC=1,4), USC (2), (USC (4), USC (2), USC (4), USC (3), ISC=1,4),
407101 * ((DISABL (ICH,ID), ICH=1,2), (TAMZML (ID,IVTAM,IGD,IM),
407102 * TAMDR (ID,IVTAM,IGD,IM), IVTAM=1,4), ID=1,9)
407103 C
407104 240 FORMAT('O',T6,'Component',T19,'|',4 (5X,A4,6X,A4)/
407105 * '+',T2,5A4,4 (2X,2A4,' ',2A4)/
407106 * (' ',2A8,T19,'|',T21,4 (2X,F7.4,2X,F8.5)))
407107 C
407108 IF (IGD.EQ.3) WRITE (IOUREP,250)
407109 * (ADET,ITER=1,4),
407110 * (USC (4),ISC=1,4), USC (2), (USC (4), USC (3), ISC=1,4),
407111 * ((DISABL (ICH,ID), ICH=1,2), (TAMDR (ID,IVTAM,IGD,IM), IVTAM=1,4),
407112 * ID=1,9)
407113 C
407114 250 FORMAT('O',T6,'Component',T19,'|',4 (15X,A4)/
407115 * '+',T2,5A4,4 (11X,2A4)/

```

Appendix C: MOBILE4 Subroutine OUTTAM

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```

407116      * (' ',2A8,T19,'|',T21,4(11X,F8.5)))
407117      GOTO 20
407118      C
407119      C Output Format 4: narrow (80 column) descriptive format:
407120      C
407121      10 WRITE(10UREP,260)
407122      * (IGTYPE(ITY,IGD),ITY=1,3),
407123      * (USC(4),ISC=1,5),USC(1),USC(4),USC(1),USC(4))
407124      C
407125      260 FORMAT('O',T45,3A4/'+' ,T45,3A4/
407126      * 'O',T26,'LDGV',T41,'LDGT1',T56,'LDGT2',T71,'HDGV'/
407127      * '+' ,T26,A4,T41,2A4,T56,2A4,T71,A4)
407128      C
407129      IF(IGD.LE.2) WRITE(10UREP,270)
407130      * (AZML,ADET,ITER=1,4),
407131      * (USC(4),ISC=1,4),USC(2), (USC(4),USC(4),USC(3),ISC=1,4),
407132      * ((DISABL(ICH,ID),ICH=1,2), (TAMZML(ID,IVTAM,IGD,IM),
407133      * TAMDR(ID,IVTAM,IGD,IM),IVTAM=1,4),ID=1,9)
407134      C
407135      270 FORMAT('O',T6,'Component',T19,'|',4(3X,A4,4X,A4)/
407136      * '+' ,T2,5A4,4(A4,' ',2A4)/
407137      * (' ',2A8,T19,'|',T21,4(F7.4,F8.5)))
407138      C
407139      IF(IGD.EQ.3) WRITE(10UREP,280)
407140      * (ADET,ITER=1,4),
407141      * (USC(4),ISC=1,4),USC(2), (USC(4),USC(3),ISC=1,4),
407142      * ((DISABL(ICH,ID),ICH=1,2), (TAMDR(ID,IVTAM,IGD,IM),IVTAM=1,4),
407143      * ID=1,9)
407144      C
407145      280 FORMAT('O',T6,'Component',T19,'|',4(11X,A4)/
407146      * '+' ,T2,5A4,4(7X,2A4)/
407147      * (' ',2A8,T19,'|',T21,4(7X,F8.5)))
407148      C
407149      20 CONTINUE
407150      C
407151      RETURN
407152      END

```



```

408000      SUBROUTINE OUTNEW
408001      C
408002      C OUTNEW writes out the new (user supplied replacement) basic emission
408003      C rate parameters and data.
408004      C
408005      C Called by OUTHD3 and OUTHD4.
408006      C
408007      C Input on call:
408008      C
408009      C common blocks:
408010      C /BASEQ3/ KINKS
408011      C /BASEQ4/ NEWPAR,BERNEW,NEWFIT,NEWCT
408012      C /IOUCOM/ IOUREP
408013      C /STRING/ NOYES
408014      C
408015      C Notes:
408016      C
408017      C OUTNEW was modified for MOBILE4 to add the above 50K miles slope.
408018      C
408019      C
408020      CHARACTER*4 NOYES,COMMA,PERIOD
408021      CHARACTER*1 COLON
408022      C
408023      COMMON /BASEQ3/ NEWVEH,NEWMYF,NEWMYL,ZMLNEW,DRNEW,KINKS
408024      COMMON /BASEQ4/NEWPAR(5,100),BERNEW(3,100),NEWFIT(100),NEWCT,MAXCT
408025      COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
408026      COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
408027      C
408028      WRITE(IOUREP,210)
408029      210 FORMAT(
408030      *'O','T16,'Emission Factor Modification Profile'/
408031      *'+','T16,'_____')
408032      C
408033      IF(KINKS.EQ.1) WRITE(IOUREP,220)
408034      220 FORMAT(
408035      *'O','Equation Reg Veh Pol First MY Last MY Base ',
408036      * 'DR Altered'/
408037      *'+','_____ - - - - - - - - - -',
408038      * '_____')
408039      C
408040      IF(KINKS.EQ.2) WRITE(IOUREP,230)
408041      230 FORMAT(
408042      *'O','Equation Reg Veh Pol First MY Last MY Base ',
408043      * 'DR 50K DR Altered'/
408044      *'+','_____ - - - - - - - - - -',
408045      * '_____')
408046      C
408047      DO 10 IFAC=1,NEWCT
408048      INO=1
408049      IF(NEWFIT(IFAC).EQ.1) INO=2
408050      C
408051      IF(BERNEW(3,IFAC).LT.0.0) WRITE(IOUREP,240) IFAC,
408052      * (NEWPAR(1,IFAC),1=1,5),(BERNEW(1,IFAC),1=1,2),NOYES(INO)
408053      240 FORMAT(' ',T4,I3,T13,I1,T18,I1,T23,I1,T29,I4,T38,I4,T46,F6.2,
408054      * T54,F6.2,T72,A4)
408055      C
408056      IF(BERNEW(3,IFAC).GE.0.0) WRITE(IOUREP,250) IFAC,
408057      * (NEWPAR(1,IFAC),1=1,5),(BERNEW(1,IFAC),1=1,3),NOYES(INO)

```

Appendix C: MOBILE4 Subroutine OUTNEW

May 5, 1989

```
408058      250 FORMAT(' ',T4,I3,T13,I1,T18,I1,T23,I1,T29,I4,T38,I4,T46,F6.2,  
408059          *      T54,F6.2,T62,F6.2,T72,A4)  
408060      10 CONTINUE  
408061      C  
408062          RETURN  
408063          END
```

```

409000      SUBROUTINE OUTIMP
409001      C
409002      C OUTIMP prints the I/M program parameters and the alternate I/M credits set
409003      C name, if it was entered.
409004      C
409005      C Called by OUTHD3 and OUTHD4.
409006      C
409007      C Input on call:
409008      C
409009      C   common blocks:
409010      C   /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIWER,CRIM
409011      C   /IMPAR2/ ILDT,ITEST,NLIM,IMNAME
409012      C   /IMPAR6/ IFREQ,INTYP
409013      C   /IOUCOM/ IOUREP
409014      C   /STRING/ NOYES
409015      C
409016      C Local array subscripts:
409017      C
409018      C   TFREQ(2,2) - TFREQ ( ICH, IFREQ )
409019      C   TINTYP(7,3) - TFREQ ( ICH, INTYP )
409020      C   TTYPE(4,3) - TTYPE ( ICH, ITEST )
409021      C
409022      C Local variable / array dictionary:
409023      C
409024      C   Name      Type      Description
409025      C   -----
409026      C   TFREQ      C*4      I/M inspection frequency description
409027      C   TINTYP      C*4      I/M program type description
409028      C   TTYPE      C*4      I/M test type description
409029      C
409030      C Notes:
409031      C
409032      C OUTIMP was modified for MOBILE4 to echo the new and changed parameters.
409033      C
409034      C
409035      C   CHARACTER*4 IMNAME
409036      C   CHARACTER*4 NOYES,COMMA,PERIOD
409037      C   CHARACTER*1 COLON
409038      C
409039      C   COMMON /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIWER(2),CRIM
409040      C   COMMON /IMPAR2/ ILDT(4),ITEST,NUDATA(2),NONUDA,NLIM,IMNAME(20,9)
409041      C   COMMON /IMPAR6/ IFREQ,INTYP
409042      C   COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
409043      C   COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
409044      C
409045      C   CHARACTER*4 TFREQ(2,2),TINTYP(7,3),TTYPE(4,3)
409046      C
409047      C   DATA TTYPE/'Idle',' ',' ',' ',' ',' ',' ',' '
409048      C   2          '2500',' rpm',' / ',' ','dle ',' '
409049      C   3          'Load','ed /',' ','ldl','e ',' /'
409050      C
409051      C   DATA TFREQ/'Annu','al ',' '
409052      C   *          'Bien','nial'/'
409053      C
409054      C   DATA TINTYP/'Cent','rali','zed ',' ',' ',' ',' ',' ',' '
409055      C   2          'Comp','uter','ized',' dec','entr','aliz','ed ',' '
409056      C   3          'Manu','al d','ecen','tral','ized',' ',' ',' '
409057      C

```

```

409058      WAIVER(1)=WAIVER(1)*100.
409059      WAIVER(2)=WAIVER(2)*100.
409060      C
409061      WRITE(10UREP,200) ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER(1),WAIVER(2),
409062      *      CRIM,(TINTYP(J,INTYP),J=1,7),(TFREQ(1,IFREQ),I=1,2)
409063      200 FORMAT('0','1/M program selected: '/
409064      *      '0','1'      Start year (January 1):      ',14/
409065      *      ' ','1'      Pre-1981 MYR stringency rate:    ',12,'%'/
409066      *      ' ','1'      First model year covered:      ',14/
409067      *      ' ','1'      Last model year covered:      ',14/
409068      *      ' ','1'      Waiver rate (pre-1981):        ',F3.0,'%'/
409069      *      ' ','1'      Waiver rate (1981 and newer):  ',F3.0,'%'/
409070      *      ' ','1'      Compliance Rate:              ',F4.0,'%'/
409071      *      ' ','1'      Inspection type:              ',7A4,/
409072      *      ' ','1'      Inspection frequency          ',2A4)
409073      C
409074      WAIVER(1)=WAIVER(1)/100.
409075      WAIVER(2)=WAIVER(2)/100.
409076      C
409077      WRITE(10UREP,210) (NOYES(ILDT(IVIM)),IVIM=1,4)
409078      210 FORMAT(' ','1'      Vehicle types covered:      LDGV - ',A4/
409079      *      ' ','1,T41,'LDGT1 - ',A4/' ','1,T41,'LDGT2 - ',A4/' ','1,T42,'HDGV - ',A4)
409080      C
409081      WRITE(10UREP,220) (TTYE(ICH,ITEST),ICH=1,4)
409082      220 FORMAT(' ','1'      1981 & later MYR test type:  ',4A4)
409083      C
409084      IF(NLIM.EQ.0) GOTO 99
409085      WRITE(10UREP,230)
409086      230 FORMAT(' ')
409087      C
409088      DO 10 LINES=1,NLIM
409089      WRITE(10UREP,240) (IMNAME(N,LINES),N=1,20)
409090      240 FORMAT(' ','1,20A4)
409091      10 CONTINUE
409092      C
409093      99 RETURN
409094      END

```

```

410000      SUBROUTINE OUTATP
410001      C
410002      C  OUTATP prints the Anti-Tampering Program (ATP) parameters.
410003      C
410004      C  Called by OUTHD3 and OUTHD4.
410005      C
410006      C  Input on call:
410007      C
410008      C    common blocks:
410009      C    /ATPAR1/ LAPSY,LAP1ST,LAPLST,LVTFLG
410010      C    /IOUCOM/ IOUREP
410011      C    /STRING/ NOYES,COMMA
410012      C    /ATPAR2/ ATPPGM,ATPFQT,CRATP,DISTYP
410013      C
410014      C  Local array subscripts:
410015      C
410016      C  IVPTR(4)  -  IVPTR ( NCOVER )
410017      C  VNAME(4)  -  VNAME ( NCOVER )
410018      C  PGM(2)   -  PGM ( ATPPGM )
410019      C  FQT(2)   -  FQT ( ATPFQT )
410020      C
410021      C  Local variable / array dictionary:
410022      C
410023      C  Name      Type      Description
410024      C  -----
410025      C  FQT       C*8      A-T program frequency names
410026      C  IVPTR      I        pointer vector into VNAME
410027      C  NCOMMA     I        number of '<vehicle class name>,' substrings to be
410028      C                        written
410029      C  NCOVER      I        number of vehicle classes covered by the A-T program
410030      C  PGM        C*13     A-T program type names
410031      C  VNAME      C*8      A-T program vehicle class names
410032      C
410033      C  Notes:
410034      C
410035      C  OUTATP was modified for MOBILE4 for AER/EVPAER internal generation.
410036      C  OUTATP was modified for MOBILE4 for new input echo formats.
410037      C
410038      C
410039      C  CHARACTER*4 NOYES,COMMA,PERIOD
410040      C  CHARACTER*1 COLON
410041      C  INTEGER ATPPGM,ATPFQT,DISTYP
410042      C
410043      C  COMMON /ATPAR1/ LAPSY,LAP1ST,LAPLST,LVTFLG(4)
410044      C  COMMON /ATPAR2/ ATPPGM,ATPFQT,CRATP,DISTYP(8)
410045      C  COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
410046      C  COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
410047      C
410048      C  CHARACTER*8 VNAME(4),FQT(2)
410049      C  CHARACTER*13 PGM(2)
410050      C  DIMENSION IVPTR(4)
410051      C
410052      C  DATA VNAME /'LDGV  ','LDGT1 ','LDGT2 ','HDGV  '/
410053      C  DATA PGM /'Centralized','Decentralized'/
410054      C  DATA FQT /'Annual ','Biennial'/
410055      C
410056      C  WRITE (IOUREP,200) LAPSY,LAP1ST,LAPLST
410057      200 FORMAT('0','Anti-tampering program selected: '/

```


Appendix C: MOBILE4 Subroutine OUTATP

May 5, 1989

```

410058      *      '0', '      Start year (January 1):      ', 10X, 14/
410059      *      ' ', '      First model year covered:      ', 10X, 14/
410060      *      ' ', '      Last model year covered:      ', 10X, 14)
410061      C
410062      NCOVER=0
410063      DO 10 IVTAM=1,4
410064      IF (LVTFLG (IVTAM).EQ.1) GOTO 10
410065      NCOVER=NCOVER+1
410066      IVPTR (NCOVER)=IVTAM
410067      10 CONTINUE
410068      C
410069      IF (NCOVER.EQ.1) WRITE (IOUREP,210) VNAME (IVPTR (1))
410070      NCOMMA=NCOVER-1
410071      IF (NCOVER.GT.1) WRITE (IOUREP,210) (VNAME (IVPTR (I2ND)),COMMA,
410072      *      I2ND=1,NCOMMA),VNAME (IVPTR (NCOVER))
410073      210 FORMAT (' ', '      Vehicle types covered:      ', 10X, 3 (A5,A2), A5)
410074      C
410075      WRITE (IOUREP,220) PGM (ATPPGM), FQT (ATPFQT), CRATP,
410076      *      (NOYES (DISTYP (IDUSER)), IDUSER=1,8)
410077      220 FORMAT ('0', '      Type:      ', 19X, A13/
410078      *      ' ', '      Frequency:      ', 19X, A8/
410079      *      ' ', '      Compliance Rate: ', 19X, F5.1, '%'/
410080      *      '0', '      Air pump system disablements:      ', A4/
410081      *      ' ', '      Catalyst removals:      ', A4/
410082      *      ' ', '      Fuel inlet restrictor disablements:      ', A4/
410083      *      ' ', '      Tailpipe lead deposit test:      ', A4/
410084      *      ' ', '      EGR disablement:      ', A4/
410085      *      ' ', '      Evaporative system disablements:      ', A4/
410086      *      ' ', '      PCV system disablements:      ', A4/
410087      *      ' ', '      Missing gas caps:      ', A4)
410088      C
410089      RETURN
410090      END

```

```

411000      SUBROUTINE OUTMTH
411001      C
411002      C   OUTMTH writes evaporative HC message on unit IOUREP.
411003      C
411004      C   Called by OUTHD3 and OUTHD4.
411005      C
411006      C   Input on call:
411007      C
411008      C       common blocks:
411009      C       /FLAGS4/ NMHFLG
411010      C       /IOUCOM/ IOUREP
411011      C
411012      C   Local array subscripts:
411013      C
411014      C   NONMTH(3) - NONMTH ( ICH )
411015      C   REMARK(15) - REMARK ( ICH )
411016      C   TOTAL(2) - TOTAL ( ICH )
411017      C
411018      C   Local variable / array dictionary:
411019      C
411020      C   Name      Type      Description
411021      C   -----
411022      C   NONMTH    C*4    character string 'Non-methane '
411023      C   REMARK    C*4    character string comment that HC ef's include evap ef's
411024      C   TOTAL     C*4    character string 'Total '
411025      C
411026      C
411027      C       INTEGER PRTFLG,HCFLAG
411028      C
411029      C       COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
411030      C       COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
411031      C
411032      C       CHARACTER*4 TOTAL(2),NONMTH(3),REMARK(15)
411033      C
411034      C       DATA TOTAL/'Tota','1  '/
411035      C
411036      C       DATA NONMTH/'Non-','meth','ane '/
411037      C
411038      C       DATA REMARK/
411039      C       *'HC e','miss','ion ','fact','ors ','incl','ude ',
411040      C       *'evap','orat','ive ','HC e','miss','ion ','fact','ors.'/
411041      C
411042      C       IF (NMHFLG.EQ.1) WRITE (IOUREP,200) TOTAL,REMARK
411043      C       200 FORMAT('O',A4,A2,15A4)
411044      C
411045      C       IF (NMHFLG.EQ.2) WRITE (IOUREP,210) NONMTH,REMARK
411046      C       210 FORMAT('O',3A4,15A4)
411047      C
411048      C       RETURN
411049      C       END

```

```

412000      SUBROUTINE USDPTR
412001      C
412002      C USDPTR finds the pointers into the user supplied data name array.
412003      C
412004      C Called by OUTHD3 and OUTHD4.
412005      C
412006      C Input on call:
412007      C
412008      C   common blocks:
412009      C   /FLAGS1/ TAMFLG
412010      C   /FLAGS2/ MYMRFG,NEWFLG
412011      C
412012      C Output on return:
412013      C
412014      C   common block: /USDATA/ NUSD,IUSD
412015      C
412016      C Notes:
412017      C
412018      C none
412019      C
412020      C
412021      C   INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
412022      C   INTEGER ALHFLG
412023      C   CHARACTER*8 USNAME
412024      C
412025      C   COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
412026      C   COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
412027      C   COMMON /USDATA/ USNAME(4,4),NUSD,IUSD(4)
412028      C
412029      C Setup scenario header user supplied data pointer vector.
412030      C
412031      C   IF (TAMFLG.EQ.1.AND.NEWFLG.EQ.1.AND.MYMRFG.EQ.1) GOTO 99
412032      C   IF (TAMFLG.EQ.1) GOTO 10
412033      C   NUSD=1
412034      C   IUSD(1)=1
412035      C 10 IF (NEWFLG.EQ.1) GOTO 20
412036      C   NUSD=NUSD+1
412037      C   IUSD(NUSD)=2
412038      C 20 IF (MYMRFG.EQ.1) GOTO 99
412039      C   IF (MYMRFG.EQ.4) GOTO 30
412040      C   NUSD=NUSD+1
412041      C   IF (MYMRFG.EQ.2) IUSD(NUSD)=3
412042      C   IF (MYMRFG.EQ.3) IUSD(NUSD)=4
412043      C   GOTO 99
412044      C 30 NUSD=NUSD+1
412045      C   IUSD(NUSD)=3
412046      C   NUSD=NUSD+1
412047      C   IUSD(NUSD)=4
412048      C
412049      C 99 RETURN
412050      C   END

```

```

413000      SUBROUTINE OUTDT1(ICY)
413001      C
413002      C   OUTDT1 writes scenario parameters and output on unit IOUREP using output
413003      C   format (OUTFMT) 1.
413004      C
413005      C   Called by OUTPUT.
413006      C
413007      C   Calls OUTPOL and FORTRAN library routine IFIX.
413008      C
413009      C   Input on call:
413010      C
413011      C       parameter list: ICY
413012      C       common blocks:
413013      C       /FLAGS4/ IDLFLG,HCFLAG
413014      C       /IOUCOM/ IOUREP
413015      C       /MAXIMA/ MAXVEH
413016      C       /REGION/ IREJN,ALT
413017      C       /RESUL1/ EFFTP,EFEHX,EFEVAP,EFLLOSS,EFRUNL
413018      C       /RESUL2/ EFIDLE
413019      C       /RESUL3/ VFTP,VEXH,VEVAP,VLOSS,VRUNLS,VIDLE
413020      C       /SCENE1/ SPD,PCCN,PCHC,PCCC
413021      C       /SC2PAR/ SCNAME
413022      C       /TEMPS/ TEMEXH
413023      C       /VMXCOM/ VMTMIX
413024      C
413025      C   Local variable dictionary:
413026      C
413027      C   Name      Type      Description
413028      C   -----
413029      C   IAMBT      I         integer equivalent of exhaust (ambient) temperature
413030      C   ICY2       I         last 2 digits of calendar (scenario evaluation) year
413031      C   IPIDLE     I         output pollutant code POL for idle efs = IP + 3
413032      C
413033      C   Notes:
413034      C
413035      C   OUTDT1 was added for MOBILE4.
413036      C
413037      C
413038      C       CHARACTER*4 SCNAME
413039      C       INTEGER PRTFLG,HCFLAG
413040      C
413041      C       COMMON /CITPAR/ SCNAME(4),FRETH,FRMETH,FRGAS
413042      C       COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
413043      C       COMMON /IOUCOM/ IOUID,IOUGEN,IOUREP,IOUERR,IOUASK
413044      C       COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
413045      C       COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
413046      C       COMMON /RESUL1/ EFFTP(3,9),EFEHX(9),EFEVAP(9),EFLLOSS(9),EFRUNL(9)
413047      C       COMMON /RESUL2/ EFIDLE(3,9)
413048      C       COMMON /RESUL3/ VFTP(3),VEXH,VEVAP,VLOSS,VRUNLS,VIDLE(3)
413049      C       COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
413050      C       COMMON /TEMPS/ AMBT,TEMMIN,TEMMA,TEMEXH(3),TEMEVP(6),TEMAST(3)
413051      C       COMMON /VMXCOM/ REGMIX(8),TFNORM(8),VMTMIX(8)
413052      C
413053      C       CALL OUTPOL(IP1,IP2)
413054      C
413055      C       ICY2=ICY-((ICY/100)*100)
413056      C
413057      C       DO 10 IP=IP1,IP2

```

Appendix C: MOBILE4 Subroutine OUTDT1

May 5, 1989

```

413058      IAMBT=IFIX(TEMEXH(IP)+.5)
413059      WRITE(IOUREP,200)
413060      * IREJN,ICY2,SPD,IAMBT,PCCN,PCHC,PCCC,ALT,
413061      * IP,(EFFTP(IP,IV),IV=1,3),EFFTP(IP,9),(EFFTP(IP,IV),IV=4,MAXVEH),
413062      * VFTP(IP),VMTMIX,SCNAME
413063      C
413064      200 FORMAT (
413065      * ' ',11,1X,12,1X,7(F4.1,'/'),F4.1,14,3F6.1,1X,F6.0,
413066      * 1X,11,10F8.3,8F6.3,1X,4A4)
413067      C
413068      C See OUTDT2 comment on id versus ef fields.
413069      C
413070      IF(IP.EQ.1.AND.HCFLAG.GE.2) WRITE(IOUREP,210)
413071      * (EFEXH(IV),IV=1,3),EFEXH(9),(EFEXH(IV),IV=4,MAXVEH),VEXH,
413072      * (EFEVAP(IV),IV=1,3),EFEVAP(9),EFEVAP(4),EFEVAP(8),VEVAP,
413073      * (EFLOSS(IV),IV=1,3),EFLOSS(9),EFLOSS(4),VLOSS,
413074      * (EFRUNL(IV),IV=1,3),EFRUNL(9),EFRUNL(4),VRUNLS
413075      C
413076      210 FORMAT(' ',74X,'X',10F8.3/
413077      * ' ',74X,'V',5F8.3,24X,2F8.3/
413078      * ' ',74X,'R',5F8.3,32X,F8.3/
413079      * ' ',74X,'T',5F8.3,32X,F8.3)
413080      C
413081      10 CONTINUE
413082      C
413083      IF(IDLFLG.EQ.1) RETURN
413084      DO 20 IP=IP1,IP2
413085      IPIDLE=IP+3
413086      WRITE(IOUREP,220)
413087      * IPIDLE,(EFIDLE(IP,IV),IV=1,3),EFIDLE(IP,9),
413088      * (EFIDLE(IP,IV),IV=4,MAXVEH),VIDLE(IP)
413089      220 FORMAT(' ',74X,11,10F8.3)
413090      20 CONTINUE
413091      C
413092      RETURN
413093      END

```


Appendix C: MOBILE4 Subroutine OUTDT2

May 5, 1989

```

SUBROUTINE OUTDT2(ICY)
C
C OUTDT2 writes scenario parameters and output on unit IOUREP using output
C format (OUTFMT) 2.
C
C Called by OUTPUT.
C
C Calls OUTPOL and FORTRAN library routine IFIX.
C
C Input on call:
C
C   parameter list: ICY
C   common blocks:
C   /FLAGS4/ IDLFLG,HCFLAG
C   /IOUCOM/ IOUREP
C   /MAXIMA/ MAXVEH
C   /REGION/ IREJN,ALT
C   /RESUL1/ EFFTP,EFEXH,EFEVAP,EFLOSS,EFRUNL
C   /RESUL2/ EFIDLE
C   /RESUL3/ VFTP,VEXH,VEVAP,VLOSS,VRUNLS,VIDLE
C   /SCENE1/ SPD,PCCN,PCHC,PCCC
C   /TEMPS/ TEMEXH
C   /VMXCOM/ VMTMIX
C
C Local variable dictionary:
C
C   Name      Type      Description
C   -----
C   IAMBT      I      integer equivalent of exhaust (ambient) temperature
C   ICY2        I      last 2 digits of calendar (scenario evaluation) year
C   IPIDLE      I      output pollutant code POL for idle efs = IP + 3
C
C Notes:
C
C OUTDT2 was added for MOBILE4.
C
C
C   INTEGER PRTFLG,HCFLAG
C
C   COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
C   COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
C   COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
C   COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
C   COMMON /RESUL1/ EFFTP(3,9),EFEXH(9),EFEVAP(9),EFLOSS(9),EFRUNL(9)
C   COMMON /RESUL2/ EFIDLE(3,9)
C   COMMON /RESUL3/ VFTP(3),VEXH,VEVAP,VLOSS,VRUNLS,VIDLE(3)
C   COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
C   COMMON /TEMPS/  AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
C   COMMON /VMXCOM/ REGMIX(8),TFNORM(8),VMTMIX(8)
C
C
C   CALL OUTPOL(IP1,IP2)
C
C   ICY2=ICY-((ICY/100)*100)
C
C   DO 10 IP=IP1,IP2
C     IAMBT=IFIX(TEMEXH(IP)+.5)
C     WRITE(IOUREP,200)
C     * IREJN,ICY2,IAMBT,PCCN,PCHC,PCCC,IP,

```

```

414058      * (EFFTP(IP,IV),IV=1,3),EFFTP(IP,9),(EFFTP(IP,IV),IV=4,MAXVEH),
414059      * VFTP(IP),VMTMIX
414060      C
414061      200 FORMAT(' ',11,1X,12,14,1X,3F6.1,1X,11,10F7.2,8(1X,F4.3))
414062      C
414063      C Only write data for HC components, since already have id fields on total
414064      C HC line. Whenever > 1 output line per scenario, postprocessor needs to
414065      C read id fields only once per scenario. The ef fields will always be in the
414066      C same columns on each output record, resulting in only two postprocessor
414067      C read formats - 1 to get id + ef fields & 1 to get ef fields only.
414068      C
414069      IF (IP.EQ.1.AND.HCFLAG.GE.2) WRITE(IOUREP,210)
414070      * (EFEXH(IV),IV=1,3),EFEXH(9),(EFEXH(IV),IV=4,MAXVEH),VEXH,
414071      * (EFEVAP(IV),IV=1,3),EFEVAP(9),EFEVAP(4),EFEVAP(8),VEVAP,
414072      * (EFLOSS(IV),IV=1,3),EFLOSS(9),EFLOSS(4),VLOSS,
414073      * (EFRUNL(IV),IV=1,3),EFRUNL(9),EFRUNL(4),VRUNLS
414074      C
414075      210 FORMAT(' ',28X,'X',10F7.2/
414076      * ' ',28X,'V',5F7.2,21X,2F7.2/
414077      * ' ',28X,'R',5F7.2,28X,F7.2/
414078      * ' ',28X,'T',5F7.2,28X,F7.2)
414079      C
414080      10 CONTINUE
414081      C
414082      IF (IDLFLG.EQ.1) RETURN
414083      DO 20 IP=IP1,IP2
414084      IPIDLE=IP+3
414085      WRITE(IOUREP,220)
414086      * IPIDLE,(EFIDLE(IP,IV),IV=1,3),EFIDLE(IP,9),
414087      * (EFIDLE(IP,IV),IV=4,MAXVEH),VIDLE(IP)
414088      220 FORMAT(' ',28X,11,10F7.2)
414089      20 CONTINUE
414090      C
414091      RETURN
414092      END

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415000      SUBROUTINE OUTDT3(ICY)
415001      C
415002      C OUTDT3 writes scenario parameters and output on unit IOUREP using output
415003      C format (OUTFMT) 3.
415004      C
415005      C Called by OUTPUT.
415006      C
415007      C Calls OUTLAP and OUTPOL.
415008      C
415009      C Input on call:
415010      C
415011      C     parameter list: ICY
415012      C     common blocks:
415013      C     /ALUHI/ AC,XLOAD,TRAILR,ABSHUM,DB,WB
415014      C     /CITRV1/ RVPICY
415015      C     /EVAPGR/ GREVP,VGREVP
415016      C     /FLAGS2/ IMFLAG,ALHFLG
415017      C     /FLAGS3/ ATPFLG
415018      C     /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
415019      C     /IOUCOM/ IOUREP
415020      C     /MAXIMA/ MAXVEH
415021      C     /REGION/ IREJN,ALT
415022      C     /RESUL1/ EFTP,EFEXH,EFEVAP,ELOSS,EFRUNL
415023      C     /RESUL2/ EFIDLE
415024      C     /RESUL3/ VFTP,VEXH,VEVAP,VLOSS,VRUNLS,VIDLE
415025      C     /SCENE1/ SPD,PCCN,PCHC,PCCC
415026      C     /STRING/ NOYES,COMMA,PERIOD
415027      C     /TEMPS/ TEMEVP,TEMEXH
415028      C     /USDATA/ USNAME,NUSD,IUSD
415029      C     /VMXCOM/ VMTMX
415030      C
415031      C Local array subscripts:
415032      C
415033      C NAMEVP(4) - NAMEVP ( IEVP )
415034      C NAMNMH(2) - NAMNMH ( NMHFLG )
415035      C NAMPOL(3) - NAMPOL ( IP )
415036      C NAMREG(3) - NAMREG ( IREJN )
415037      C NAMVEH(10) - NAMVEH ( IVF3 )
415038      C
415039      C Local variable / array dictionary:
415040      C
415041      C      Name      Type      Description
415042      C      -----
415043      C      IP1        I        see parameter dictionary
415044      C      IP2        I        see parameter dictionary
415045      C      NAMNMH      C*8      prefix indicating type of HC (total vs non-methane)
415046      C      NAMPOL      C*4      pollutant names
415047      C      NAMREG      C*4      region names
415048      C      NAMVEH      C*8      vehicle class names
415049      C      NWITHC      I        number of substrings to be written with a comma appended
415050      C      USC8        C*8      8 character underscore
415051      C      ZENE        C*4      character string 'zene', suffix completing 'benzene'
415052      C
415053      C Notes:
415054      C
415055      C OUTDT3 was updated in MOBILE4 to print ef results to 3 dp instead of 2.
415056      C OUTDT3 was modified in MOBILE4.
415057      C

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415058 C
415059 INTEGER ALHFLG
415060 INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
415061 INTEGER PRTFLG,HCFLAG
415062 CHARACTER*8 USNAME
415063 CHARACTER*4 NOYES,COMMA,PERIOD
415064 CHARACTER*1 COLON
415065 C
415066 C
415067 COMMON /ALUHIN/ AC,XLOAD(3),TRAILR(3),ABSHUM,DB,WB
415068 COMMON /CITRV1/ RVPBAS,RVPIUS,RVPAST,RVPICY,RVPETH,IUSESY,RATUNC
415069 COMMON /EVAPGR/ EVP(4),GREVP(4,9),VGREVP(4)
415070 COMMON /FLAGS2/ MYMRF,NEWFLG,IMFLAG,ALHFLG
415071 COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
415072 COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
415073 COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
415074 COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
415075 COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
415076 COMMON /RESUL1/ EFFTP(3,9),EFEXH(9),EFEVAP(9),EFLOSS(9),EFRUNL(9)
415077 COMMON /RESUL2/ EFIDLE(3,9)
415078 COMMON /RESUL3/ VFTP(3),VEXH,VEVAP,VLOSS,VRUNLS,VIDLE(3)
415079 COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
415080 COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
415081 COMMON /TEMPS/ AMBT,TEMMIN,TEMMA,TEMEXH(3),TEMEVP(6),TEMAST(3)
415082 COMMON /USDATA/ USNAME(4,4),NUSD,IUSD(4)
415083 COMMON /VMXCOM/ REGMIX(8),TFNORM(8),VMTMIX(8)
415084 C
415085 CHARACTER*9 NAMVEH(10),NAMNMH(2),USC8,NAMEVP(4)
415086 C
415087 CHARACTER*4 NAMREG(3),NAMPOL(3),ZENE
415088 C
415089 DATA NAMVEH/
415090 * ' LDGV',
415091 * ' LDGT1',
415092 * ' LDGT2',
415093 * ' LDGT',
415094 * ' HDGV',
415095 * ' LDDV',
415096 * ' LDDT',
415097 * ' HDDV',
415098 * ' MC ',
415099 * ' All Veh' /
415100 C
415101 DATA NAMREG/'Low ','High','Mid '/
415102 C
415103 DATA USC8/' ____' /
415104 C
415105 DATA NAMPOL/' HC:',' CO:',' NOX: '/
415106 C
415107 DATA NAMNMH/'Total ','Non-Meth' /
415108 C
415109 DATA NAMEVP/'Hot Soak ','Diurnal ','Multiple ','Crankcase' /
415110 C
415111 C
415112 CALL OUTPOL(IP1,IP2)
415113 C
415114 IF (NUSD.EQ.0) GOTO 10
415115 IF (NUSD.EQ.1) WRITE (IOUREP,200) (USNAME(ICH,IUSD(1)),ICH=1,4),

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415116      *                      PERIOD
415117      NWTHC=NUSD-1
415118      IF (NWTHC.GT.0) WRITE (IOUREP,200)
415119      * ((USNAME (ICH,IUSD (ICT)),ICH=1,4),COMMA,1CT=1,NWTHC),
415120      * (USNAME (ICH,IUSD (NUSD)),ICH=1,4),PERIOD
415121      200 FORMAT ('0','User supplied',4A8,T46,A1,4A8,T78,A1,4A8,T110,A1/
415122      *          ' ',T15,4A8,T46,A1)
415123      C
415124      10 IF (PRTFLG.LT.4) WRITE (IOUREP,210)
415125      * ICY,NOYES (IMFLAG),TEMEXH (IPI),NAMREG (IREJN)
415126      210 FORMAT (
415127      * '0', T2,'Cal. Year:',I5,
415128      * T25,'I/M Program: ',A4,
415129      * T48,'Ambient Temp:',F5.1,' (F)',
415130      * T85,'Region: ',A4)
415131      C
415132      IF (PRTFLG.EQ.4) WRITE (IOUREP,215)
415133      * ICY,NOYES (IMFLAG),TEMEXH,NAMREG (IREJN)
415134      215 FORMAT (
415135      * '0', T2,'Cal. Year:',I5,
415136      * T25,'I/M Program: ',A4,
415137      * T48,'Ambient Temp:',F5.1,2(' /',F5.1),' (F)',
415138      * T85,'Region: ',A4)
415139      C
415140      WRITE (IOUREP,220)
415141      * NOYES (ATPFLG),PCCN,PCHC,PCCC,ALT
415142      220 FORMAT (
415143      * ' ',T19,'Anti-tam. Program: ',A4,
415144      * T46,'Operating Mode:',F5.1,2(' /',F5.1),
415145      * T83,'Altitude:',F6.0,' Ft.')
415146      C
415147      IF (LOCFLG.EQ.1) CALL OUTLAP
415148      C
415149      IF (ALHFLG.GT.1) WRITE (IOUREP,225)
415150      * ABSHUM,
415151      * AC,DB,WB
415152      225 FORMAT (
415153      * ' ',T19,'Absolute Humidity:',F6.2,
415154      * T48,'AC (DB / WB):',F5.1,' (' ,F5.1,' /',F5.1,')')
415155      C
415156      WRITE (IOUREP,230)
415157      * NAMVEH, (USCB,ITER=1,10),
415158      * SPD,
415159      * VMTMIX
415160      230 FORMAT (
415161      * '0',' Veh. Type:',10(2X,A8) / '+',T15,9(2X,A8),1X,A8/
415162      * ' ', 'Veh. Speeds:',F9.1,2F10.1,10X,5F10.1/
415163      * ' ', ' VMT Mix:',F11.3,2F10.3,10X,5F10.3)
415164      C
415165      IF (ALHFLG.GT.1) WRITE (IOUREP,235)
415166      * XLOAD,
415167      * TRAILR
415168      235 FORMAT (
415169      * ' ', 'Extra Load:',F11.3,2F10.3/
415170      * ' ', 'Trlr in Tow:',F11.3,2F10.3)
415171      C
415172      WRITE (IOUREP,240)
415173      240 FORMAT (

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415174      *'O','Composite Emission Factors (Gm/Mile)')
415175      C
415176      DO 30 IP=IP1,IP2
415177      IF (IP.NE.1) GOTO 20
415178      C
415179      C HC pass: print ef's scaled in grams.
415180      C
415181      WRITE (IOUREP,250)
415182      * NAMMMH (NMHFLG),NAMPOL (IP),
415183      * (EFFTP (IP,IV),IV=1,3),EFFTP (IP,9), (EFFTP (IP,IV),IV=4,MAXVEH),
415184      * VFTP (IP)
415185      250 FORMAT (
415186      * ' ',A8,A4,
415187      * 9F10.2,
415188      * F10.3)
415189      C
415190      C HCFLAG >= 2 means write out HC components also.
415191      C
415192      C MOBILE4 print blanks for diesel evap & refueling HC, not zeroes.
415193      C
415194      IF (HCFLAG.GE.2) WRITE (IOUREP,260)
415195      * NAMPOL (IP),
415196      * (EFEXH (IV),IV=1,3),EFEXH (9), (EFEXH (IV),IV=4,MAXVEH),VEXH,
415197      * NAMPOL (IP),
415198      * (EFEVAP (IV),IV=1,3),EFEVAP (9),EFEVAP (4),EFEVAP (8),VEVAP,
415199      * NAMPOL (IP),
415200      * (EFLOSS (IV),IV=1,3),EFLOSS (9),EFLOSS (4),VLOSS,
415201      * NAMPOL (IP),
415202      * (EFRUNL (IV),IV=1,3),EFRUNL (9),EFRUNL (4),VRUNLS
415203      260 FORMAT (
415204      * ' ', 'Exhaust ',A4,9F10.2,F10.3/
415205      * ' ', 'Evaporat',A4,5F10.2,30X,F10.2,F10.3/
415206      * ' ', 'Refuel L',A4,5F10.2,40X,F10.3/
415207      * ' ', 'Runing L',A4,5F10.2,40X,F10.3)
415208      GOTO 30
415209      C
415210      20 WRITE (IOUREP,265)
415211      * NAMPOL (IP),
415212      * (EFFTP (IP,IV),IV=1,3),EFFTP (IP,9), (EFFTP (IP,IV),IV=4,MAXVEH),
415213      * VFTP (IP)
415214      265 FORMAT (
415215      * ' ', 'Exhaust ',A4,
415216      * 9F10.2,
415217      * F10.3)
415218      30 CONTINUE
415219      C
415220      IF (IDLFLG.EQ.1) GOTO 55
415221      WRITE (IOUREP,270)
415222      270 FORMAT (
415223      *'O','Hot Stabilized Idle Emission Factors (Gm/Hr)')
415224      C
415225      DO 50 IP=IP1,IP2
415226      IF (IP.NE.1.OR.NMHFLG.EQ.1) GOTO 40
415227      C
415228      WRITE (IOUREP,275)
415229      * NAMPOL (IP),
415230      * (EFIDLE (IP,IV),IV=1,3),EFIDLE (IP,9), (EFIDLE (IP,IV),IV=4,MAXVEH),
415231      * VIDLE (IP)

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415232      275 FORMAT (
415233          * ' ', 'NM-Idle ', A4,
415234          *   9F10.2,
415235          *   F10.3)
415236          GOTO 50
415237      C
415238      40 WRITE (IOUREP,280)
415239          *   NAMPOL (IP),
415240          *   (EFIDLE (IP,IV), IV=1,3), EFIDLE (IP,9), (EFIDLE (IP,IV), IV=4,MAXVEH),
415241          *   VIDLE (IP)
415242      280 FORMAT (
415243          * ' ', 'Idle ', A4,
415244          *   9F10.2,
415245          *   F10.3)
415246      50 CONTINUE
415247      C
415248      55 IF (HCFLAG.NE.3) GOTO 65
415249          WRITE (IOUREP,285) RVPICY,TEMEVP (1),TEMEVP (2)
415250      285 FORMAT (
415251          * 'O', 'Evaporative Emissions by Component',
415252          * 15X, 'Weathered RVP:', F5.1,
415253          * T79, 'Hot Soak Temp:', F5.1, ' (F) ' /
415254          * ' ', '(Hot Soak: g/trip, Diurnal & Multiple: g, Crankcase: g/mi)',
415255          * T75, 'Running Loss Temp:', F5.1, ' (F) ')
415256      C
415257          DO 60 IEVP=1,4
415258      C
415259          IF (IEVP.NE.3) WRITE (IOUREP,290)
415260          *   NAMEVP (IEVP), (GREVP (IEVP,IV), IV=1,3), GREVP (IEVP,9),
415261          *   (GREVP (IEVP,IV), IV=4,MAXVEH), VGREVP (IEVP)
415262      290 FORMAT (' ', A9, 3X, 9F10.2, F10.3)
415263      C
415264          IF (IEVP.EQ.3) WRITE (IOUREP,295)
415265          *   NAMEVP (IEVP), (GREVP (IEVP,IV), IV=1,3), GREVP (IEVP,9),
415266          *   (GREVP (IEVP,IV), IV=4,7), VGREVP (IEVP)
415267      295 FORMAT (' ', A9, 3X, 8F10.2, 6X, '----', F10.3)
415268      60 CONTINUE
415269      C
415270      65 WRITE (IOUREP,300)
415271      300 FORMAT (' ', 112 ('_'))
415272      C
415273          RETURN
415274          END

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416000      SUBROUTINE OUTDT4(ICY)
416001      C
416002      C OUTDT4 writes scenario parameters and output on unit IOUREP using output
416003      C format (OUTFMT) 4.
416004      C
416005      C Called by OUTPUT.
416006      C
416007      C Calls OUTLAP and OUTPOL.
416008      C
416009      C input on call:
416010      C
416011      C     parameter list: ICY
416012      C     common blocks:
416013      C     /ALUHI/ AC,XLOAD,TRAILR,ABSHUM,DB,WB
416014      C     /FLAGS2/ IMFLAG,ALHFLG
416015      C     /FLAGS3/ ATPFLG
416016      C     /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
416017      C     /IOUCOM/ IOUREP
416018      C     /MAXIMA/ MAXVEH
416019      C     /REGION/ IREJN,ALT
416020      C     /RESUL1/ EFTP,EFEXH,EFEVAP,ELOSS,EFRUNL
416021      C     /RESUL2/ EFIDLE
416022      C     /RESUL3/ VFTP,VEXH,VEVAP,VLOSS,VRUNLS,VIDLE
416023      C     /SCENE1/ SPD,PCCN,PCHC,PCCC
416024      C     /TEMPS/ TEMEXH
416025      C     /STRING/ NOYES,COMMA,PERIOD
416026      C     /USDATA/ USNAME,NUSD,IUSD
416027      C     /VMXCOM/ VMTMIX
416028      C
416029      C Local array subscripts:
416030      C
416031      C NAMNMH(2) - NAMNMH ( NMHFLG )
416032      C NAMPOL(3) - NAMNMH ( IP )
416033      C NAMREG(3) - NAMREG ( IREJN )
416034      C NAMVEH(10) - NAMVEH ( IVF3 )
416035      C
416036      C Local variable / array dictionary:
416037      C
416038      C      Name      Type      Description
416039      C      -----
416040      C      IP1       I         see parameter dictionary
416041      C      IP2       I         see parameter dictionary
416042      C      NAMNMH    C*8      prefix indicating type of HC (total vs non-methane)
416043      C      NAMPOL    C*4      pollutant names
416044      C      NAMREG    C*4      region names
416045      C      NAMVEH    C*8      vehicle class names
416046      C      NWTHC     I         number of substrings to be written with a comma appended
416047      C      USC8      C*8      8 character underscore
416048      C
416049      C Notes:
416050      C
416051      C OUTDT4 was modified in MOBILE4.
416052      C
416053      C
416054      C     INTEGER ALHFLG
416055      C     INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
416056      C     INTEGER PRTFLG,HCFLAG
416057      C     CHARACTER*8 USNAME

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416058 CHARACTER*4 NOYES,COMMA,PERIOD
416059 CHARACTER*1 COLON
416060 C
416061 C
416062 COMMON /ALUHN/ AC,XLOAD(3),TRAILR(3),ABSHUM,DB,WB
416063 COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
416064 COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
416065 COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
416066 COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
416067 COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
416068 COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
416069 COMMON /RESUL1/ EFFTP(3,9),EFEXH(9),EFEVAP(9),EFLOSS(9),EFRUNL(9)
416070 COMMON /RESUL2/ EFIDLE(3,9)
416071 COMMON /RESUL3/ VFTP(3),VEXH,VEVAP,VLOSS,VRUNLS,VIDLE(3)
416072 COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
416073 COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
416074 COMMON /TEMPS/ AMBT,TEMMIN,TEMMA,TEMEXH(3),TEMEVP(6),TEMAST(3)
416075 COMMON /USDATA/ USNAME(4,4),NUSD,IUSD(4)
416076 COMMON /VMXCOM/ REGMIX(8),TFNORM(8),VMTMIX(8)
416077 C
416078 CHARACTER*8 NAMVEH(10),NAMNMH(2),USC8
416079 CHARACTER*4 NAMREG(3),NAMPOL(3)
416080 C
416081 DATA NAMVEH/
416082 * ' LDGV ',
416083 * ' LDGT1 ',
416084 * ' LDGT2 ',
416085 * ' LDGT ',
416086 * ' HDGV ',
416087 * ' LDDV ',
416088 * ' LDDT ',
416089 * ' HDDV ',
416090 * ' MC ',
416091 * 'All Veh '/
416092 C
416093 DATA USC8/' _____ '/
416094 C
416095 DATA NAMREG/'Low ','High','Mid '/
416096 C
416097 DATA NAMPOL/' HC:', ' CO:', 'NOX: '/
416098 C
416099 DATA NAMNMH/'Total ', 'No-Mth '/
416100 C
416101 CALL OUTPOL(IP1,IP2)
416102 C
416103 IF(NUSD.EQ.0) GOTO 10
416104 IF(NUSD.EQ.1) WRITE(IOUREP,200) (USNAME(ICH,IUSD(1)),ICH=1,4),
416105 * PERIOD
416106 NWITHC=NUSD-1
416107 IF(NWITHC.GT.0) WRITE(IOUREP,200)
416108 * ((USNAME(ICH,IUSD(1CT)),ICH=1,4),COMMA,1CT=1,NWITHC),
416109 * (USNAME(ICH,IUSD(NUSD)),ICH=1,4),PERIOD
416110 200 FORMAT('0','User supplied',4A8,T46,A1,4A8,T78,A1/
416111 * ' ', T15,4A8,T46,A1,4A8,T78,A1)
416112 C
416113 C Colons are aligned on columns 30 and 53 for the 80 column scenario header.
416114 C
416115 10 IF(PRTFLG.LT.4) WRITE(IOUREP,210)

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416116      *   ICY,NAMREG (IREJN),ALT,
416117      *   NOYES (IMFLAG),TEMEXH (IP1)
416118      210 FORMAT (
416119      *   'O', T2,'Cal. Year:',I5,
416120      *   T28,'Region: ',A4,
416121      *   T50,'Altitude:',F6.0,' Ft.' /
416122      *   ',T23,'I/M Program: ',A4,
416123      *   T46,'Ambient Temp:',F7.1,' (F)')
416124      C
416125      IF (PRTFLG.EQ.4) WRITE (IOUREP,215)
416126      *   ICY,NAMREG (IREJN),ALT,
416127      *   NOYES (IMFLAG),TEMEXH
416128      215 FORMAT (
416129      *   'O', T2,'Cal. Year:',I5,
416130      *   T28,'Region: ',A4,
416131      *   T50,'Altitude:',F6.0,' Ft.' /
416132      *   ',T23,'I/M Program: ',A4,
416133      *   T46,'Ambient Temp:',F7.1,2(' /',F5.1),' F')
416134      C
416135      WRITE (IOUREP,220)
416136      *   NOYES (ATPFLG),PCCN,PCHC,PCCC
416137      220 FORMAT (
416138      *   ',T17,'Anti-tam. Program: ',A4,
416139      *   T44,'Operating Mode:',F7.1,2(' /',F5.1))
416140      C
416141      IF (LOCFLG.EQ.1) CALL OUTLAP
416142      C
416143      IF (ALHFLG.GT.1) WRITE (IOUREP,225)
416144      *   ABSHUM,
416145      *   AC,DB,WB
416146      225 FORMAT (
416147      *   ',T17,'Absolute Humidity:',F6.2,
416148      *   T46,'AC (DB / WB):',F7.1,' ('',F5.1,' /',F5.1,'')')
416149      C
416150      WRITE (IOUREP,230)
416151      *   NAMVEH, (USC8,ITER=1,10),
416152      *   SPD,
416153      *   VMTMIX
416154      230 FORMAT (
416155      *   'O', 'Veh. Type:',10A7/'+' ,T12,10A7/
416156      *   ', 'Veh. Spd.:',F5.1,2F7.1,7X,5F7.1/
416157      *   ', 'VMT Mix:',3F7.3,7X,5F7.3)
416158      C
416159      IF (ALHFLG.GT.1) WRITE (IOUREP,235)
416160      *   XLOAD,
416161      *   TRAILR
416162      235 FORMAT (
416163      *   ', 'Ext. Load:',3F7.3/
416164      *   ', 'Trlr Tow:',3F7.3)
416165      C
416166      WRITE (IOUREP,240)
416167      240 FORMAT (
416168      *   'O', 'Composite Emission Factors (Gm/Mile)')
416169      C
416170      DO 30 IP=IP1,IP2
416171      IF (IP.NE.1) GOTO 20
416172      C
416173      WRITE (IOUREP,250)

```



```

416174      * NAMNMH(NMHFLG),NAMPOL(IP),
416175      * (EFFTP(IP,IV),IV=1,3),EFFTP(IP,9),(EFFTP(IP,IV),IV=4,MAXVEH),
416176      * VFTP(IP)
416177      250 FORMAT (
416178      * ' ',A6,A4,F6.2,9F7.2)
416179      C
416180      IF (HCFLAG.GE.2) WRITE(IOUREP,260)
416181      * NAMPOL(IP),
416182      * (EFEXH(IV),IV=1,3),EFEXH(9),(EFEXH(IV),IV=4,MAXVEH),VEXH,
416183      * NAMPOL(IP),
416184      * (EFEVAP(IV),IV=1,3),EFEVAP(9),EFEVAP(4),EFEVAP(8),VEVAP,
416185      * NAMPOL(IP),
416186      * (EFLOSS(IV),IV=1,3),EFLOSS(9),EFLOSS(4),VLOSS,
416187      * NAMPOL(IP),
416188      * (EFRUNL(IV),IV=1,3),EFRUNL(9),EFRUNL(4),VRUNLS
416189      260 FORMAT (
416190      * ' ', 'Exhst ',A4,F6.2,9F7.2/
416191      * ' ', 'Evap. ',A4,F6.2,4F7.2,21X,2F7.2/
416192      * ' ', 'Refuel ',A4,F6.2,4F7.2,28X,F7.2/
416193      * ' ', 'Runing ',A4,F6.2,4F7.2,28X,F7.2)
416194      GOTO 30
416195      C
416196      20 WRITE(IOUREP,265)
416197      * NAMPOL(IP),
416198      * (EFFTP(IP,IV),IV=1,3),EFFTP(IP,9),(EFFTP(IP,IV),IV=4,MAXVEH),
416199      * VFTP(IP)
416200      265 FORMAT (
416201      * ' ', 'Exhst ',A4,
416202      * F6.2,8F7.2,
416203      * F7.2)
416204      30 CONTINUE
416205      C
416206      IF (IDLFLG.EQ.1) GOTO 60
416207      WRITE(IOUREP,270)
416208      270 FORMAT (
416209      * 'O', 'Hot Stabilized Idle Emission Factors (Gm/Hr) ')
416210      C
416211      DO 50 IP=IP1,IP2
416212      IF (IP.NE.1.OR.NMHFLG.EQ.1) GOTO 40
416213      C
416214      WRITE(IOUREP,275)
416215      * NAMPOL(IP),
416216      * (EFIDLE(IP,IV),IV=1,3),EFIDLE(IP,9),(EFIDLE(IP,IV),IV=4,MAXVEH),
416217      * VIDLE(IP)
416218      275 FORMAT (
416219      * ' ', 'NM-Id ',A4,
416220      * F6.2,8F7.2,
416221      * F7.2)
416222      GOTO 50
416223      C
416224      40 WRITE(IOUREP,280)
416225      * NAMPOL(IP),
416226      * (EFIDLE(IP,IV),IV=1,3),EFIDLE(IP,9),(EFIDLE(IP,IV),IV=4,MAXVEH),
416227      * VIDLE(IP)
416228      280 FORMAT (
416229      * ' ', 'Idle ',A4,
416230      * F6.2,8F7.2,
416231      * F7.2)

```

Appendix C: MOBILE4 Subroutine OUTDT4

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```
416232      50 CONTINUE
416233      C
416234      60 WRITE (IOUREP,290)
416235      290 FORMAT(' ',80(' '))
416236      C
416237      RETURN
416238      END
```

Appendix C: MOBILE4 Subroutine OUTPOL

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```
417000      SUBROUTINE OUTPOL(IP1,IP2)
417001      C
417002      C  OUTPOL selects loop parameters for pollutant printouts.
417003      C
417004      C  Called by OUTDT1, OUTDT2, OUTDT3 and OUTDT4.
417005      C
417006      C  Input on call:
417007      C
417008      C      common blocks:
417009      C      /FLAGS4/ PRTFLG
417010      C      /MAXIMA/ MAXPOL
417011      C
417012      C  Output on return:
417013      C
417014      C      parameter list: IP1,IP2
417015      C
417016      C
417017      C      INTEGER PRTFLG,HCFLAG
417018      C
417019      C      COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
417020      C      COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
417021      C
417022      C      IP1=PRTFLG
417023      C      IP2=PRTFLG
417024      C      IF (PRTFLG.LT.4) GOTO 99
417025      C      IP1=1
417026      C      IP2=MAXPOL
417027      C
417028      C  99 RETURN
417029      C  END
```

Appendix C: MOBILE4 Subroutine OUTLAP

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```

418000      SUBROUTINE OUTLAP
418001      C
418002      C OUTLAP echoes the user supplied values for the fields of the local area
418003      C parameters ("LAP") record. This record is echoed as the last echo of 1-time
418004      C data, if LOCFLG = 2, or after the 1st scenario record echo of each scenario,
418005      C if LOCFLG = 1. The echo record length depends on OUTFMT, since OUTFMT = 3
418006      C allows records up to 112 characters long, while OUTFMT = 4 limits records to
418007      C a maximum of 80 characters (the LAP record is only echoed by the descriptive
418008      C formats, 3 and 4).
418009      C
418010      C Called by OUTHD3, OUTHD4, OUTDT3 and OUTDT4.
418011      C
418012      C Input on call:
418013      C
418014      C common blocks:
418015      C /CITPAR/ SCNAME, (in-house vsn only: FRETH)
418016      C /CITRV1/ RVPBAS,RVPIUS,IUSESY
418017      C /CITRV3/ ASTMCL
418018      C /FLAGS3/ OUTFMT
418019      C /IOUCOM/ IOUREP
418020      C /TEMPS/ TEMMIN,TEMMAX
418021      C
418022      C Output on return:
418023      C
418024      C none.
418025      C
418026      C Notes:
418027      C
418028      C Echo fields are vertically aligned by the colons preceding the values.
418029      C Note that the T formats reference a 113 and 81 column format, respectively.
418030      C Each output column 1 is reserved for carriage control, with the remainder
418031      C being printed.
418032      C
418033      C Echo FRETH &/or FRMETH only if fields restored in post-release version.
418034      C FRMETH was not echoed before, so only FRETH echo had to be removed.
418035      C
418036      C OUTLAP was added for MOBILE4.
418037      C OUTLAP was modified for MOBILE4.
418038      C
418039      C
418040      CHARACTER*1 ASTMCL,AClass
418041      CHARACTER*4 SCNAME
418042      INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
418043      C
418044      COMMON /CITPAR/ SCNAME(4),FRETH,FRMETH,FRGAS
418045      COMMON /CITRV1/ RVPBAS,RVPIUS,RVPAST,RVPICY,RVPETH,IUSESY,RATUNC
418046      COMMON /CITRV3/ RVPMAP(5),RVPX(2,2),IClass,ASTMCL,AClass(5)
418047      COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
418048      COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
418049      COMMON /TEMPS/ AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
418050      C
418051      C 112 column format colons aligned at T13, T36, T60 and T91.
418052      C
418053      IF (OUTFMT.EQ.3) WRITE(IOUREP,200)
418054      * SCNAME,ASTMCL,TEMMIN,TEMMAX,RVPBAS,RVPIUS,IUSESY
418055      200 FORMAT('0',T2,4A4,T26,'ASTM Class: ',A1,
418056      * T48,'Minimum Temp: ',F4.0,' (F)',
418057      * T79,'Maximum Temp: ',F4.0,' (F)'/

```

Appendix C: MOBILE4 Subroutine OUTLAP

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```
418058      *      ' ',T5, 'Base RVP: ',F4.1,T26,'In-use RVP: ',F4.1,
418059      *      T45,'In-use Start Yr: ',I4)
418060  CC      *      T75,'Ethanol Fraction: ',F4.2)
418061  C
418062  C      80 column format colons aligned at T34, T58 and T76.
418063  C
418064      IF (OUTFMT.EQ.4) WRITE (IOUREP,210)
418065      *      SCNAME,ASTMCL,TEMMIN,TEMMAX,RVPBAS,RVPIUS,IUSESY
418066  210 FORMAT('O',T2,4A4,T24,'ASTM Class: ',A1/
418067  CC      *      T46,'Ethanol Frac: ',F4.2/
418068      *      ' ',T22,'Minimum Temp:',F4.0,' (F) ',
418069      *      T46,'Maximum Temp:',F4.0,' (F) '/
418070      *      ' ',T26,'Base RVP: ',F4.1,T43,'In-use (IU) RVP: ',F4.1,
418071      *      T67,'IU 1st Yr: ',I4)
418072  C
418073      RETURN
418074      END
```



```

501000      BLOCK DATA BD01
501001      C
501002      C BLOCK DATA Subprogram 01: /SPEED1/
501003      C
501004      C BLOCK DATA 01 defines and initializes the speed correction factor (scf)
501005      C coefficients for vehicle types LDGV, LDGT1/2 and MC.
501006      C
501007      C Common block array subscripts:
501008      C
501009      C SK1(6,21,3)      - SK1 ( ICOEF5, ISP, IP )
501010      C SH(6,21)       - SH ( ICOEF5, ISP )
501011      C SC(6,21)       - SC ( ICOEF5, ISP )
501012      C SN(6,21)       - SN ( ICOEF5, ISP )
501013      C SKG(2,6,2)      - SKG ( IS2C, ISP, IPG )
501014      C SK2C(2,14,2,3) - SK2C ( IS2C, ISP, IPG, IVLDG )
501015      C SK2N(3,14,3)    - SK2N ( IS2N, ISP, IVLDG )
501016      C
501017      C Common block dictionary:
501018      C
501019      C   Name      Type      Description
501020      C   -----
501021      C /SPEED1/:
501022      C
501023      C SK1          R      scf coefficients for HC, CO & NOx for LDGV, LDGT1/2 & MC
501024      C                                     SH/C/N - the 3 arrays in this BD appear as SK1 in BEGIN1
501025      C                                     SK1 is partitioned in BD 01 so that the local arrays can be
501026      C                                     EQUIVALENCED to its storage area. FORTRAN does not allow a
501027      C                                     local array to be EQU'd to beyond the first cell of a COMMON
501028      C                                     array dimension (SK1(1,10,1),SH2(1,1) is illegal), unless
501029      C                                     the dimension is rightmost (SK1(1,1,2),SC2(1,1) is legal).
501030      C SH           R      HC scf coefficients for IV=1,2,3,8
501031      C SC           R      CO scf coefficients for IV=1,2,3,8
501032      C SN           R      NOX scf coefficients for IV=1,2,3,8
501033      C SK2C         R      low spd <19.6 HC&CO scf coeffs for the 1st new eq case (A/X+B)
501034      C SKG          R      high speed >19.6 HC & CO scf coefficients for the 1st case
501035      C SK2N         R      scf coefficients for the 2nd new equation case EXP(A+B*X+C*X**2)
501036      C                                     for NOx
501037      C
501038      C Local array subscripts:
501039      C
501040      C SH1(6,9)      - SH1( ICOEF5, ISP )
501041      C SH2(6,9)      - SH2( ICOEF5, ISP )
501042      C SC1(6,9)      - SC1( ICOEF5, ISP )
501043      C SC2(6,9)      - SC2( ICOEF5, ISP )
501044      C SN1(6,9)      - SN1( ICOEF5, ISP )
501045      C SN2(6,9)      - SN2( ICOEF5, ISP )
501046      C SK2CV(2,14,2) - SK2CV ( IS2C, ISP, IPG )
501047      C SK2CT1(2,14,2) - SK2CT1 ( IS2C, ISP, IPG )
501048      C SK2CT2(2,14,2) - SK2CT2 ( IS2C, ISP, IPG )
501049      C SK2NV(3,14)    - SK2NV ( IS2N, ISP )
501050      C SK2NT1(3,14)   - SK2NT1 ( IS2N, ISP )
501051      C SK2NT2(3,14)   - SK2NT2 ( IS2N, ISP )
501052      C
501053      C Local array dictionary:
501054      C
501055      C   Name      Type      Description
501056      C   -----
501057      C SK1          R      5th degree poly. coef. for SK1 HC IG=1 thru 9

```

Appendix C: MOBILE4 Block Data 01

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```

501058 C SH2      R      5th degree poly. coef. for SK1 HC  IG=10 thru 18
501059 C SC1      R      5th degree poly. coef. for SK1 CO  IG=1 thru 9
501060 C SC2      R      5th degree poly. coef. for SK1 CO  IG=10 thru 18
501061 C SN1      R      5th degree poly. coef. for SK1 NOx IG=1 thru 9
501062 C SN2      R      5th degree poly. coef. for SK1 NOx IG=10 thru 18
501063 C SK2CV     R      A/X+B coef. for LDGV HC & CO
501064 C SK2CT1    R      A/X+B coef. for LDGT1 HC & CO
501065 C SK2CT2    R      A/X+B coef. for LDGT2 HC & CO
501066 C SK2NV     R      EXP(A+B*X+C*X**2) coef. for LDGV NOx
501067 C SK2NT1    R      EXP(A+B*X+C*X**2) coef. for LDGT1 NOx
501068 C SK2NT2    R      EXP(A+B*X+C*X**2) coef. for LDGT2 NOx
501069 C
501070 C Notes:
501071 C
501072 C SK1(19+.) coefficients of MOBILE3 replaced by SK2 in MOBILE4.
501073 C SK2C HC & CO coefficients were updated for MOBILE4.
501074 C
501075 C
501076 C      COMMON /SPEED1/ SH(6,18),SC(6,18),SN(6,18),SK2C(2,14,2,3),
501077 C      *      SKG(2,6,2),SK2N(3,14,3)
501078 C
501079 C      DIMENSION SH1(6,9),SH2(6,9),SC1(6,9),SC2(6,9),SN1(6,9),SN2(6,9)
501080 C      DIMENSION SK2CV(2,14,2),SK2CT1(2,14,2),SK2CT2(2,14,2)
501081 C      DIMENSION SK2NV(3,14),SK2NT1(3,14),SK2NT2(3,14)
501082 C
501083 C      EQUIVALENCE
501084 C      * (SH(1,1),SH1(1,1)), (SH(1,10),SH2(1,1)),
501085 C      * (SC(1,1),SC1(1,1)), (SC(1,10),SC2(1,1)),
501086 C      * (SN(1,1),SN1(1,1)), (SN(1,10),SN2(1,1)),
501087 C      * (SK2C(1,1,1,1),SK2CV(1,1,1)),
501088 C      * (SK2C(1,1,1,2),SK2CT1(1,1,1)),
501089 C      * (SK2C(1,1,1,3),SK2CT2(1,1,1)),
501090 C      * (SK2N(1,1,1),SK2NV(1,1)),
501091 C      * (SK2N(1,1,2),SK2NT1(1,1)),
501092 C      * (SK2N(1,1,3),SK2NT2(1,1))
501093 C
501094 C      5th degree polynomial HC scf coefficients
501095 C
501096 C      DATA SH1/
501097 C      *      2.24612E+00, -2.90973E-01, 1.58890E-02,
501098 C      *      -4.72494E-04, 6.94077E-06, -3.92798E-08,
501099 C      *      2.31026E+00, -2.89572E-01, 1.52990E-02,
501100 C      *      -4.46689E-04, 6.48183E-06, -3.63456E-08,
501101 C      *      2.16556E+00, -2.69992E-01, 1.44221E-02,
501102 C      *      -4.33638E-04, 6.50735E-06, -3.78100E-08,
501103 C      *      2.39726E+00, -2.99985E-01, 1.61351E-02,
501104 C      *      -4.87491E-04, 7.29093E-06, -4.19769E-08,
501105 C      *      2.40873E+00, -3.08187E-01, 1.68168E-02,
501106 C      *      -5.06843E-04, 7.53855E-06, -4.31596E-08,
501107 C      *      2.23217E+00, -2.84985E-01, 1.53833E-02,
501108 C      *      -4.56738E-04, 6.73486E-06, -3.83798E-08,
501109 C      *      2.25223E+00, -2.87778E-01, 1.56820E-02,
501110 C      *      -4.73179E-04, 7.07954E-06, -4.08456E-08,
501111 C      *      2.02779E+00, -2.73049E-01, 1.53577E-02,
501112 C      *      -4.60304E-04, 6.78527E-06, -3.84880E-08,
501113 C      *      2.15056E+00, -2.83620E-01, 1.53836E-02,
501114 C      *      -4.42136E-04, 6.28732E-06, -3.46311E-08/
501115 C      DATA SH2/

```

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501116	*	2.23021E+00,	-2.93648E-01,	1.62356E-02,	
501117	*		-4.84148E-04,	7.11591E-06,	-4.02861E-08,
501118	*	2.12230E+00,	-2.91072E-01,	1.69089E-02,	
501119	*		-5.76148E-04,	8.02705E-06,	-4.70117E-08,
501120	*	2.15361E+00,	-2.83451E-01,	1.56948E-02,	
501121	*		-4.69759E-04,	6.93832E-06,	-3.94707E-08,
501122	*	2.07346E+00,	-2.89353E-01,	1.73042E-02,	
501123	*		-5.54707E-04,	8.64204E-06,	-5.13107E-08,
501124	*	2.34948E+00,	-3.04959E-01,	1.68416E-02,	
501125	*		-5.09623E-04,	7.59516E-06,	-4.34963E-08,
501126	*	2.11340E+00,	-2.85676E-01,	1.63180E-02,	
501127	*		-5.00793E-04,	7.55067E-06,	-4.37187E-08,
501128	*	2.11940E+00,	-2.98632E-01,	1.84473E-02,	
501129	*		-6.16544E-04,	9.92062E-06,	-6.04021E-08,
501130	*	2.68382E+00,	-3.44633E-01,	1.95417E-02,	
501131	*		-6.25720E-04,	9.78442E-06,	-5.83369E-08,
501132	*	2.39540E+00,	-3.35781E-01,	2.11609E-02,	
501133	*		-7.31550E-04,	1.20715E-05,	-7.48567E-08/

C

C 5th degree polynomial CO scf coefficients

C

DATA SC1/					
501137	*	1.81978E+00,	-2.54663E-01,	1.52347E-02,	
501138	*		-4.87397E-04,	7.58207E-06,	-4.49514E-08,
501139	*	2.33989E+00,	-2.96978E-01,	1.60071E-02,	
501140	*		-4.77396E-04,	7.06752E-06,	-4.03978E-08,
501141	*	2.44154E+00,	-2.91473E-01,	1.42949E-02,	
501142	*		-3.87852E-04,	5.29781E-06,	-2.82441E-08,
501143	*	2.46551E+00,	-3.05023E-01,	1.60497E-02,	
501144	*		-4.73969E-04,	6.99075E-06,	-3.99758E-08,
501145	*	2.77804E+00,	-3.19130E-01,	1.53183E-02,	
501146	*		-4.22327E-04,	5.84948E-06,	-3.14969E-08,
501147	*	2.78899E+00,	-3.27107E-01,	1.62943E-02,	
501148	*		-4.67573E-04,	6.71906E-06,	-3.74401E-08,
501149	*	2.70743E+00,	-3.31038E-01,	1.76179E-02,	
501150	*		-5.38583E-04,	8.17402E-06,	-4.77803E-08,
501151	*	1.86919E+00,	-2.76679E-01,	1.72335E-02,	
501152	*		-5.58279E-04,	8.71678E-06,	-5.16980E-08,
501153	*	1.82133E+00,	-2.72054E-01,	1.70304E-02,	
501154	*		-5.52021E-04,	8.62543E-06,	-5.11440E-08/

DATA SC2/

501157	*	2.01421E+00,	-2.95188E-01,	1.86353E-02,	
501158	*		-6.21606E-04,	9.93657E-06,	-5.99779E-08,
501159	*	2.04533E+00,	-3.10618E-01,	2.04852E-02,	
501160	*		-7.08527E-04,	1.16215E-05,	-7.15690E-08,
501161	*	2.31868E+00,	-3.41147E-01,	2.09446E-02,	
501162	*		-6.65891E-04,	1.02225E-05,	-5.98265E-08,
501163	*	2.57522E+00,	-3.28888E-01,	1.89747E-02,	
501164	*		-6.28263E-04,	1.00924E-05,	-6.12727E-08,
501165	*	2.68454E+00,	-3.32817E-01,	1.76277E-02,	
501166	*		-5.24123E-04,	7.72221E-06,	-4.37025E-08,
501167	*	2.15487E+00,	-3.29116E-01,	2.10112E-02,	
501168	*		-6.89057E-04,	1.08390E-05,	-6.47125E-08,
501169	*	2.54557E+00,	-3.62954E-01,	2.32775E-02,	
501170	*		-8.15039E-04,	1.36231E-05,	-8.55909E-08,
501171	*	2.83929E+00,	-3.68756E-01,	2.10782E-02,	
501172	*		-6.76438E-04,	1.06267E-05,	-6.36405E-08,
501173	*	2.48747E+00,	-3.91562E-01,	2.70721E-02,	

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```

501174      *      -9.76178E-04,   1.65270E-05,  -1.04317E-07/
501175      C
501176      C 5th degree polynomial NOX scf coefficients
501177      C
501178      DATA SN1/
501179      *      2.44424E+00,  -2.50107E-01,   1.38293E-02,
501180      *      -2.87025E-04,   2.07585E-06,   0.00000E+00,
501181      *      1.68635E+00,  -1.18303E-01,   6.54975E-03,
501182      *      -1.37139E-04,   1.00849E-06,   0.00000E+00,
501183      *      1.12646E+00,  -3.93405E-02,   2.68637E-03,
501184      *      -6.08024E-05,   4.77286E-07,   0.00000E+00,
501185      *      1.22677E+00,  -4.44978E-02,   2.62476E-03,
501186      *      -5.67150E-05,   4.34293E-07,   0.00000E+00,
501187      *      1.01743E+00,  -1.18958E-02,   9.14365E-04,
501188      *      -2.15740E-05,   1.82300E-07,   0.00000E+00,
501189      *      9.87600E-01,  -1.95674E-02,   1.69645E-03,
501190      *      -4.04000E-05,   3.28001E-07,   0.00000E+00,
501191      *      1.15917E+00,  -4.44536E-02,   2.96425E-03,
501192      *      -6.68990E-05,   5.22365E-07,   0.00000E+00,
501193      *      1.88656E+00,  -1.61289E-01,   9.04995E-03,
501194      *      -1.85609E-04,   1.32555E-06,   0.00000E+00,
501195      *      1.55777E+00,  -1.13032E-01,   6.71832E-03,
501196      *      -1.43409E-04,   1.06079E-06,   0.00000E+00/
501197      DATA SN2/
501198      *      2.04516E+00,  -1.94014E-01,   1.10736E-02,
501199      *      -2.31754E-04,   1.68372E-06,   0.00000E+00,
501200      *      1.63262E+00,  -1.21861E-01,   7.03020E-03,
501201      *      -1.46293E-04,   1.06141E-06,   0.00000E+00,
501202      *      1.44825E+00,  -1.22444E-01,   7.95024E-03,
501203      *      -1.71078E-04,   1.25777E-06,   0.00000E+00,
501204      *      2.45969E-01,   8.41954E-02,  -3.40841E-03,
501205      *      6.29880E-05,  -4.13975E-07,   0.00000E+00,
501206      *      1.28169E+00,  -8.04874E-02,   5.35735E-03,
501207      *      -1.18891E-04,   9.01060E-07,   0.00000E+00,
501208      *      1.53447E+00,  -1.25671E-01,   7.85919E-03,
501209      *      -1.69428E-04,   1.25494E-06,   0.00000E+00,
501210      *      7.04805E-01,   3.81527E-02,  -1.73907E-03,
501211      *      3.26140E-05,  -2.03847E-07,   0.00000E+00,
501212      *      7.83838E-01,   3.28549E-04,   1.06029E-03,
501213      *      -3.19350E-05,   2.90389E-07,   0.00000E+00,
501214      *      9.42131E-01,  -4.23240E-02,   3.86253E-03,
501215      *      -9.39853E-05,   7.53883E-07,   0.00000E+00/
501216      C
501217      C All cases of 1st new (for MOBILE4) scf equation form, A/X+B, for HC & CO:
501218      C
501219      C      A      B      A      B      A      B
501220      C      DATA SK2CV/
501221      C HC
501222      H 37.95604, 0.0,   10.60380, 0.0,   10.82023, 0.0,
501223      H 10.88869, 0.0,   8.74266, -0.07927, 8.92062, -0.08068,
501224      H 7.76209, -0.06197, 5.23198, -0.02100, 4.98885, -0.01610,
501225      H 4.78677, -0.01203, 4.70467, -0.01037, 4.62258, -0.00872,
501226      H 4.45523, -0.00535, 4.32577, -0.00274,
501227      C CO
501228      C 490.9863, -1.97820, 107.2439, 0.96562, 113.2776, 0.86151,
501229      C 117.2362, 0.75511, 87.7782, -0.14450, 91.7873, -0.10426,
501230      C 73.3586, 0.60021, 33.1973, 2.14936, 30.1170, 2.39638,
501231      C 27.5568, 2.60169, 26.5167, 2.68510, 25.4766, 2.76850,

```

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501232      C 23.3563, 2.93853, 21.7162, 3.07006/
501233      C
501234      DATA SK2CT1/
501235      C HC
501236      H 41.2792, 0.0, 14.5053, 0.0, 13.1351, 0.0,
501237      H 13.7285, 0.0, 12.8759, 0.0, 12.2991, 0.0,
501238      H 6.0371, -0.03723, 5.0267, -0.01687, 4.7994, -0.01228,
501239      H 4.7678, -0.01165, 4.7331, -0.01095, 4.7299, -0.01088,
501240      H 4.5973, -0.00821, 2*0.0,
501241      C CO
501242      C 563.5144, -3.44034, 168.8941, 0.72193, 147.4764, 0.80430,
501243      C 158.0700, 0.75053, 145.3224, 0.77799, 137.3680, 0.76426,
501244      C 43.3983, 1.33132, 30.5971, 2.35788, 27.7168, 2.58886,
501245      C 27.3167, 2.62094, 26.8767, 2.65622, 26.8367, 2.65943,
501246      C 25.1565, 2.79417, 2*0.0/
501247      C
501248      DATA SK2CT2/
501249      C HC
501250      H 41.2792, 0.0, 14.5053, 0.0, 13.1351, 0.0,
501251      H 13.7285, 0.0, 12.8759, 0.0, 12.2991, 0.0,
501252      H 6.0371, -0.03723, 5.0267, -0.01687, 4.7994, -0.01228,
501253      H 4.7678, -0.01165, 4.7331, -0.01095, 4.7299, -0.01088,
501254      H 4.5973, -0.00821, 2*0.0,
501255      C CO
501256      C 563.5144, -3.44034, 168.8941, 0.72193, 147.4764, 0.80430,
501257      C 158.0700, 0.75053, 145.3224, 0.77799, 137.3680, 0.76426,
501258      C 43.3983, 1.33132, 30.5971, 2.35788, 27.7168, 2.58886,
501259      C 27.3167, 2.62094, 26.8767, 2.65622, 26.8367, 2.65943,
501260      C 25.1565, 2.79417, 2*0.0/
501261      C
501262      DATA SKG/
501263      H 8.1, 0.0, 10*0.0,
501264      C 60.0, 0.0, 10*0.0/
501265      C
501266      C All cases of 2nd new for MOBILE4 scf equation form, EXP (A+B*X+C*X**2),
501267      C for NOX:
501268      C The continuation line code is NOx.
501269      C
501270      C
501271      C
501272      C      A      B      C      A      B      C
501273      C      DATA SK2NV/
501274      N 1.04330, -0.026082, 4.2835E-04, 0.18957, -0.033673, 4.7036E-04,
501275      N 0.20906, -0.033673, 4.7036E-04, 0.22795, -0.033673, 4.7036E-04,
501276      N -0.02994, -0.023254, 1.7100E-04, -0.03852, -0.022703, 1.6500E-04,
501277      N -0.04694, -0.023881, 1.7700E-04, -0.06606, -0.026426, 2.0485E-04,
501278      N -0.07443, -0.026426, 2.0485E-04, -0.08138, -0.026426, 2.0485E-04,
501279      N -0.08420, -0.026426, 2.0485E-04, -0.08703, -0.026426, 2.0485E-04,
501280      N -0.09279, -0.026426, 2.0485E-04, -0.09724, -0.026426, 2.0485E-04/
501281      C
501282      C      DATA SK2NT1/
501283      N 1.04330, -0.026082, 4.2835E-04, 0.24736, -0.033673, 4.7036E-04,
501284      N 0.22790, -0.033673, 4.7036E-04, 0.24101, -0.033673, 4.7036E-04,
501285      N 0.23298, -0.033673, 4.7036E-04, 0.23289, -0.033673, 4.7036E-04,
501286      N -0.03836, -0.026426, 2.0485E-04, -0.07312, -0.026426, 2.0485E-04,
501287      N -0.08094, -0.026426, 2.0485E-04, -0.08203, -0.026426, 2.0485E-04,
501288      N -0.08323, -0.026426, 2.0485E-04, -0.08333, -0.026426, 2.0485E-04,
501289      N -0.08790, -0.026426, 2.0485E-04, 3*0.0/
501290      C
501291      C      DATA SK2NT2/

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501290	N	1.04330, -0.026082, 4.2835E-04, 0.24736, -0.033673, 4.7036E-04,
501291	N	0.22790, -0.033673, 4.7036E-04, 0.24101, -0.033673, 4.7036E-04,
501292	N	0.23298, -0.033673, 4.7036E-04, 0.23289, -0.033673, 4.7036E-04,
501293	N	-0.03836, -0.026426, 2.0485E-04, -0.07312, -0.026426, 2.0485E-04,
501294	N	-0.08094, -0.026426, 2.0485E-04, -0.08203, -0.026426, 2.0485E-04,
501295	N	-0.08323, -0.026426, 2.0485E-04, -0.08333, -0.026426, 2.0485E-04,
501296	N	-0.08790, -0.026426, 2.0485E-04, 3*0.0/
501297	C	
501298		END

502000 BLOCK DATA BD02

502001 C
 502002 C BLOCK DATA Subprogram 02: /SPEED2/,/SPEED3/,/SPEED4/,/SPEED5/,/SPEED6/,
 502003 C /SPEED7/
 502004 C
 502005 C BLOCK DATA 02 defines the last years of the model year groups used for
 502006 C speed correction factor (scf) coefficients, variables and arrays used in the
 502007 C calculation of the scf, the high speed CO scf coefficient parameters, and
 502008 C the speed and optional features correction factor array generated by BIGSAL.
 502009 C
 502010 C Common block array subscripts:
 502011 C
 502012 C GPBSCO(3,3,4) - GPBSCO (ICOEF2, IP, IVB)
 502013 C ISPGRP(3,4) - ISPGRP (IP, IVA)
 502014 C MAXHSP(3) - MAXHSP (IVLDG)
 502015 C MYGSMC(18,2,3) - MYGSMC (IG, IR, IP)
 502016 C MYGSP1(18,2,3) - MYGSP1 (IG, IR, IV)
 502017 C MYGSP2(3,3) - MYGSP2 (IP, IVLDG)
 502018 C MYHSPC(2,3) - MYHSPC (IG, IVLDG)
 502019 C LBISTS(3) - LBISTS (IVLDG)
 502020 C SALHCF(20,3,8) - SALHCF (IDX, IP, IV)
 502021 C SCADJ1(3,4) - SCADJ1 (IP, IVA)
 502022 C SCUNA1(18,3,8) - SCUNA1 (IG, IP, IV)
 502023 C
 502024 C Common block dictionary:
 502025 C
 502026 C Name Type Description
 502027 C -----
 502028 C /SPEED2/:
 502029 C
 502030 C MYGSP1 I scf myg last years for old equation for LDGV, LDGT1 & LDGT2
 502031 C MYGSMC I scf myg last years for MC
 502032 C MYGSP2 I 1st myg ub model years for new scf equations for LDGV/T
 502033 C
 502034 C /SPEED3/:
 502035 C
 502036 C SADJ R FTP operating mode speeds weighted together by the vmt
 502037 C fraction for each to get scenario's average speed
 502038 C SCUNA1 R speed correction factors, adjusting bef's, which are
 502039 C calculated at an assumed average speed of 19.6 mph, to
 502040 C ef's at the user entered scenario average speed
 502041 C SCADJ1 R SCUNA1 adjustment for the difference between 19.6 and SADJ
 502042 C ISPGRP I the speed coefficient group last used for the given IV & IP.
 502043 C ISPGRP eliminates recalculating SCADJ1 for every MY.
 502044 C
 502045 C /SPEED4/:
 502046 C
 502047 C MAXSP1 I maximum no. of mygs for the old LDGV/T & MC scf equation coeffs
 502048 C LBISTS I 1b my of 1st myg using new scf equations (ex:A/X+B) for IVLDG
 502049 C LBLAST I 1b my of last myg of the new LDGV/T scf equation coeffs
 502050 C IVA,IVB see Subscript Dictionary in source code header (1,999)
 502051 C
 502052 C /SPEED5/:
 502053 C
 502054 C MYHSPC I first my of first and last myg's of the high speed HC and CO
 502055 C scf A/X + B coefficients
 502056 C MAXHSP I maximum no. of mygs for the high speed HC and CO scf A/X + B
 502057 C coeffs

```

502058 C
502059 C /SPEED6/:
502060 C
502061 C SALHCF R speed and optional correction factors to apply to basic
502062 C emission factors
502063 C
502064 C /SPEED7/
502065 C
502066 C GPBSCO R 2nd degree polynomial IVB scf coefficients, unchanged since
502067 C MOBILE2. (MOBILE2 reduced HDGV cases from 3 to 1 myg)
502068 C
502069 C Local array subscripts:
502070 C
502071 C ISPDY1(18,2) - ISPDY1( IG, IR )
502072 C ISPDY2(18,2) - ISPDY2( IG, IR )
502073 C ISPDY3(18,2) - ISPDY3( IG, IR )
502074 C
502075 C Local array dictionary:
502076 C
502077 C Name Type Description
502078 C -----
502079 C ISPDY1 I the last year of LDGV scf model year group
502080 C ISPDY2 I the last year of LDGT1 scf model year group
502081 C ISPDY3 I the last year of LDGT2 scf model year group
502082 C
502083 C Notes:
502084 C
502085 C The /SPEEDd/ CBs were added for MOBILE4, consolidating all speed cf related
502086 C variables and arrays, both carryovers from MOBILE3 and parameters new for
502087 C MOBILE4. Values assigned during the course of execution are here set to
502088 C dummy zeroes or ones.
502089 C
502090 C
502091 C COMMON /SPEED2/ MYGSP1(18,2,3),MYGSMC(18,2,3),MYGSP2(3,3)
502092 C COMMON /SPEED3/ SADJ,SCUNA1(18,3,8),SCADJ1(3,4),ISPGRP(3,4)
502093 C COMMON /SPEED4/ MAXSP1,LB1STS(3),LBLAST,IVB,IVA
502094 C COMMON /SPEED5/ MYHSPC(2,3),MAXHSP(3)
502095 C COMMON /SPEED6/ SALHCF(20,3,8)
502096 C COMMON /SPEED7/ GPBSCO(3,3,4)
502097 C
502098 C DIMENSION ISPDY1(18,2),ISPDY2(18,2),ISPDY3(18,2)
502099 C
502100 C EQUIVALENCE
502101 C *(MYGSP1(1,1,1),ISPDY1(1,1)),
502102 C *(MYGSP1(1,1,2),ISPDY2(1,1)),
502103 C *(MYGSP1(1,1,3),ISPDY3(1,1))
502104 C
502105 C /SPEED2/:
502106 C
502107 C Myg upper bounds for 5th degree polynomial scf equation form coefficients.
502108 C
502109 C DATA ISPDY1/
502110 C Low
502111 C * 0000,1967,0000,1968,1969,1970,1971,0000,0000,0000,
502112 C * 0000,0000,0000,1972,0000,0000,1974,1976,
502113 C High
502114 C * 1967,0000,0000,0000,0000,0000,0000,1968,1969,1970,
502115 C * 1971,1972,0000,0000,1974,0000,0000,1976/

```

```

502116 C
502117 DATA ISPDY2/
502118 C Low
502119 * 0000,1967,0000,1968,1969,1970,1971,0000,0000,0000,
502120 * 0000,0000,0000,1972,0000,0000,1974,1978,
502121 C High
502122 * 1967,0000,0000,0000,0000,0000,0000,1968,1969,1970,
502123 * 1971,1972,0000,0000,1974,0000,0000,1978/
502124 C
502125 DATA ISPDY3/
502126 C Low
502127 * 0000,1969,0000,0000,1973,0000,0000,0000,0000,0000,
502128 * 0000,0000,0000,0000,0000,0000,1978,0000,
502129 C High
502130 * 1969,0000,0000,0000,0000,0000,0000,0000,0000,0000,
502131 * 0000,1973,0000,0000,1978,0000,0000,0000/
502132 C
502133 DATA MYGSMC/
502134 C HC
502135 C Low
502136 L 0000,1977,0000,0000,1979,0000,2020,0000,0000,0000,
502137 L 0000,0000,0000,0000,0000,0000,0000,0000,
502138 C High
502139 H 1977,0000,0000,0000,0000,0000,0000,0000,1979,0000,
502140 H 2020,0000,0000,0000,0000,0000,0000,0000,
502141 C CO
502142 C Low
502143 L 0000,1977,0000,0000,1979,0000,2020,0000,0000,0000,
502144 L 0000,0000,0000,0000,0000,0000,0000,0000,
502145 C High
502146 H 1977,0000,0000,0000,0000,0000,0000,0000,1979,0000,
502147 H 2020,0000,0000,0000,0000,0000,0000,0000,
502148 C NOX
502149 C Low
502150 L 0000,1977,0000,0000,0000,0000,0000,0000,0000,0000,
502151 L 0000,0000,0000,2020,0000,0000,0000,0000,
502152 C High
502153 H 1977,0000,0000,0000,0000,0000,0000,0000,0000,0000,
502154 H 0000,2020,0000,0000,0000,0000,0000,0000/
502155 C
502156 C Myg upper bounds for the A/X+B & A+B*X+C*X**2 scf equation coefficients.
502157 C
502158 C HC CO NOX
502159 DATA MYGSP2/
502160 1 1979, 1979, 1979,
502161 2 1980, 1980, 1980,
502162 3 1980, 1980, 1980/
502163 C
502164 C /SPEED3/:
502165 C
502166 C All dummy zeroes.
502167 C
502168 DATA SADJ/0.0/,SCUNA1/432*0.0/,SCADJ1/12*0.0/,ISPGRP/12*0/
502169 C
502170 C /SPEED4/:
502171 C
502172 C "True" scf parameters.
502173 C

```


Appendix C: MOBILE4 Block Data 02

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```

502174      DATA MAXSP1/18/,LB1STS/1977,1979,1979/,LBLAST/1992/
502175      C
502176      C Dummy zeroes.
502177      C
502178      DATA IVB,IVA/2*0/
502179      C
502180      C /SPEED5/:
502181      C
502182      C MYGs for the high speed HC and CO scf coefficients for the new A/X + B
502183      C equation. Originally had 6,3,3 myg, now have 1 myg each; This may change
502184      C again.
502185      C
502186      DATA MYHSPC/ 1977,1977, 1979,1979, 1979,1979 /
502187      DATA MAXHSP/ 1, 1, 1 /
502188      C
502189      C /SPEED6/:
502190      C
502191      C All dummy ones (instead of zeroes, since SALHCF is a multiplicative cf).
502192      C
502193      DATA SALHCF/480*1.0/
502194      C
502195      C /SPEED7/:
502196      C
502197      C The continuation line code for GPBSCO is IV.
502198      C
502199      DATA GPBSCO/
502200      C          HC          CO          NOX
502201      C          -----
502202      4  1.608,-.097,.00083,  1.5200,-.098,.00110,  .824,.0088,.0,
502203      5  .909,-.055,.00044,  1.3752,-.088,.00091,  .668,-.048,.00071,
502204      6  .909,-.055,.00044,  1.3752,-.088,.00091,  .668,-.048,.00071,
502205      7  .924,-.055,.00044,  1.3960,-.088,.00091,  .676,-.048,.00071/
502206      C
502207      C
502208      END

```


503000 BLOCK DATA BD03

503001 C
 503002 C BLOCK DATA Subprogram 03: /BASEQ2/,/BASEQ4/,/BASEQ6/
 503003 C
 503004 C BLOCK DATA 03 defines the model year groups (by their upper bounds) and
 503005 C associated parameters used to select and index the intercept and slope
 503006 C arrays for the basic FTP Emission Rate (ER) equations.
 503007 C
 503008 C Common block array subscripts:
 503009 C
 503010 C BERNEW(3,100) - BERNEW (IBER, IFAC)
 503011 C MYGERB(20,3,8,2) - MYGERB (IG, IP, IV, IR)
 503012 C MYGERU(12,2,3,8,2) - MYGERU (JG, IFL, IP, IV, IR)
 503013 C NEWFIT(100) - NEWFIT (IFAC)
 503014 C NEWPAR(5,100) - NEWPAR (IPAR, IFAC)
 503015 C NUMERU(3,8,2) - NUMERU (IP, IV, IR)
 503016 C
 503017 C Common block dictionary:
 503018 C
 503019 C Name Type Description
 503020 C -----
 503021 C /BASEQ2/:
 503022 C
 503023 C MYGERB I myg upper bounds for Block Data hardcoded FTP emission rate
 503024 C equation intercept & (LDGV <50K) slope arrays (ERBZML, ERBDR)
 503025 C MAXERB I maximum number of BD hardcoded ER equations possible for any
 503026 C given combination of IP, IV and IR. MAXERB is the limit of
 503027 C the myg dimension of arrays ERBZML, ERBDR and MYGERB.
 503028 C
 503029 C /BASEQ4/:
 503030 C
 503031 C NEWPAR R parameters identifying where (region, vehicle type and
 503032 C pollutant) and when (first & last model years included)
 503033 C to use new (user supplied) emission rates
 503034 C BERNEW R intercept and slopes of user supplied emission rates
 503035 C NEWFIT I whether or not (1 or 0) user supplied emission rate
 503036 C information can be fit into the affected data arrays
 503037 C (no => the new rate is not stored & not used)
 503038 C NEWCT I count of number of sets of new emission rate specifications
 503039 C entered by user (not necessarily the number actually used -
 503040 C see NEWFIT)
 503041 C MAXCT I maximum number of sets allowed by NEWFLG = sets dimension of
 503042 C the arrays of /BASEQ4/
 503043 C
 503044 C /BASEQ6/:
 503045 C
 503046 C MYGERU I myg lower & upper bounds for User supplied FTP emission rate
 503047 C equation intercept and slopes arrays (ERUZML, ERUDR, ERU50K)
 503048 C MAXERU I maximum number of user supplied ER equation parameters sets
 503049 C allowed for each IP x IV x IR case (same limit for each case)
 503050 C NUMERU I number of user supplied ER records successfully stored for
 503051 C each IP x IV x IR case.
 503052 C KEYER I key to which intercept and slope arrays pair (triple, if LDGV
 503053 C 81+ HC or CO) to use in the ER equation calculation in BEF's
 503054 C current IP x IV x IR case:
 503055 C 1 = (ERBZML, ERBDR & ERB50K) 2 = (ERUZML, ERUDR & ERU50K)
 503056 C IGER I myg index into the ER intercept and slope arrays selected by
 503057 C KEYER. KEYER & IGER are set and returned by IERPTR.

```

503058 C
503059 C Local array subscripts:
503060 C
503061 C IERLO<IV>(20,3) - IERLO<IV> ( IG, IP )
503062 C IERHI<IV>(20,3) - IERHI<IV> ( IG, IP )
503063 C
503064 C Local array dictionary:
503065 C
503066 C Name Type Descriptions
503067 C -----
503068 C IERLO<IV> I low altitude myg upper bounds for hardcoded FTP ERs
503069 C IERHI<IV> I high altitude myg upper bounds for hardcoded FTP ERs
503070 C
503071 C Notes:
503072 C
503073 C BD 03 was updated for MOBILE4.
503074 C
503075 C
503076 COMMON /BASEQ2/ MYGERB(20,3,8,2),MAXERB
503077 COMMON /BASEQ4/NEWPAR(5,100),BERNEW(3,100),NEWFIT(100),NEWCT,MAXCT
503078 COMMON /BASEQ6/ MYGERU(12,2,3,8,2),MAXERU,NUMERU(3,8,2),KEYER,IGER
503079 C
503080 DIMENSION
503081 * IERLO1(20,3),
503082 * IERLO2(20,3),
503083 * IERLO3(20,3),
503084 * IERLO4(20,3),
503085 * IERLO5(20,3),
503086 * IERLO6(20,3),
503087 * IERLO7(20,3),
503088 * IERLO8(20,3)
503089 C
503090 EQUIVALENCE
503091 * (MYGERB(1,1,1,1),IERLO1(1,1)),
503092 * (MYGERB(1,1,2,1),IERLO2(1,1)),
503093 * (MYGERB(1,1,3,1),IERLO3(1,1)),
503094 * (MYGERB(1,1,4,1),IERLO4(1,1)),
503095 * (MYGERB(1,1,5,1),IERLO5(1,1)),
503096 * (MYGERB(1,1,6,1),IERLO6(1,1)),
503097 * (MYGERB(1,1,7,1),IERLO7(1,1)),
503098 * (MYGERB(1,1,8,1),IERLO8(1,1))
503099 C
503100 DIMENSION
503101 * IERHI1(20,3),
503102 * IERHI2(20,3),
503103 * IERHI3(20,3),
503104 * IERHI4(20,3),
503105 * IERHI5(20,3),
503106 * IERHI6(20,3),
503107 * IERHI7(20,3),
503108 * IERHI8(20,3)
503109 C
503110 EQUIVALENCE
503111 * (MYGERB(1,1,1,2),IERHI1(1,1)),
503112 * (MYGERB(1,1,2,2),IERHI2(1,1)),
503113 * (MYGERB(1,1,3,2),IERHI3(1,1)),
503114 * (MYGERB(1,1,4,2),IERHI4(1,1)),
503115 * (MYGERB(1,1,5,2),IERHI5(1,1)),

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503116      * (MYGERB(1,1,6,2),IERHI6(1,1)),
503117      * (MYGERB(1,1,7,2),IERHI7(1,1)),
503118      * (MYGERB(1,1,8,2),IERHI8(1,1))
503119      C
503120      C
503121      C /BASEQ2/:
503122      C
503123      C
503124      C Continuation line code is the pollutant type:
503125      C
503126      C      H = HC      C = CO      N = NOx
503127      C
503128      C mygs for low altitude FTP emission rates
503129      C
503130      DATA IERL01/
503131      H 1967,1969,1971,1974,1979,1980,1981,1982,1983,1984,
503132      H 1985,1986,1987,1988,1989,1990,1991,2020,0000,0000,
503133      C 1967,1969,1971,1974,1979,1980,1981,1982,1983,1984,
503134      C 1985,1986,1987,1988,1989,1990,1991,2020,0000,0000,
503135      N 1967,1972,1974,1976,1979,1980,1981,1982,1983,1984,
503136      N 1985,1986,1987,1988,1989,1990,1991,2020,0000,0000/
503137      C
503138      DATA IERL02/
503139      H 1967,1969,1971,1974,1978,1980,1983,1984,1985,1986,
503140      H 1987,1988,1989,1990,1991,2020,0000,0000,0000,0000,
503141      C 1967,1969,1971,1974,1978,1980,1983,1984,1985,1986,
503142      C 1987,1988,1989,1990,1991,2020,0000,0000,0000,0000,
503143      N 1967,1972,1974,1978,1980,1983,1984,1985,1986,1987,
503144      N 1988,1989,1990,1991,2020,0000,0000,0000,0000,0000/
503145      C
503146      DATA IERL03/
503147      H 1969,1973,1978,1980,1983,1984,1985,1986,1987,1988,
503148      H 1989,1990,1991,2020,0000,0000,0000,0000,0000,0000,
503149      C 1969,1973,1978,1980,1983,1984,1985,1986,1987,1988,
503150      C 1989,1990,1991,2020,0000,0000,0000,0000,0000,0000,
503151      N 1969,1973,1978,1980,1983,1984,1985,1986,1987,1988,
503152      N 1989,1990,1991,2020,0000,0000,0000,0000,0000,0000/
503153      C
503154      DATA IERL04/
503155      H 1962,1969,1973,1974,1975,1976,1978,1979,1980,1983,
503156      H 1984,1985,1986,1989,1990,2000,2020,0000,0000,0000,
503157      C 1962,1969,1973,1974,1975,1976,1978,1979,1980,1983,
503158      C 1984,1985,1986,1989,1990,2000,2020,0000,0000,0000,
503159      N 1962,1969,1973,1974,1975,1976,1978,1979,1980,1983,
503160      N 1984,1985,1986,1989,1990,2000,2020,0000,0000,0000/
503161      C
503162      DATA IERL05/
503163      H 1974,1976,1977,1978,1979,2020,0000,0000,0000,0000,
503164      H 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
503165      C 1974,1976,1977,1978,1979,2020,0000,0000,0000,0000,
503166      C 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
503167      N 1974,1976,1977,1978,1979,1980,1984,2020,0000,0000,
503168      N 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000/
503169      C
503170      DATA IERL06/
503171      H 1977,1980,2020,0000,0000,0000,0000,0000,0000,0000,
503172      H 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
503173      C 1977,1980,2020,0000,0000,0000,0000,0000,0000,0000,

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503174	C	0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
503175	N	1977,1980,1987,1989,2020,0000,0000,0000,0000,0000,
503176	N	0000,0000,0000,0000,0000,0000,0000,0000,0000,0000/
503177	C	
503178		DATA IERLO7/
503179	H	1966,1968,1969,1970,1973,1976,1977,1978,1979,1981,
503180	H	1982,1983,1984,1985,1986,1987,1989,1990,2000,2020,
503181	H	1966,1968,1969,1970,1973,1976,1977,1978,1979,1981,
503182	H	1982,1983,1984,1985,1986,1987,1989,1990,2000,2020,
503183	H	1966,1968,1969,1970,1973,1976,1977,1978,1979,1981,
503184	H	1982,1983,1984,1985,1986,1987,1989,1990,2000,2020/
503185	C	
503186		DATA IERLO8/
503187	H	1977,1979,1981,1984,1987,2020,0000,0000,0000,0000,
503188	H	0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
503189	C	1977,1979,1981,2020,0000,0000,0000,0000,0000,0000,
503190	C	0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
503191	N	1977,1979,2020,0000,0000,0000,0000,0000,0000,0000,
503192	N	0000,0000,0000,0000,0000,0000,0000,0000,0000,0000/
503193	C	
503194	C	mygs for high altitude FTP emission rates
503195	C	
503196		DATA IERH11/
503197	H	1967,1969,1971,1974,1976,1977,1979,1980,1981,1982,
503198	H	1983,1984,1985,1986,1987,1988,1989,1990,1991,2020,
503199	C	1967,1969,1971,1974,1976,1977,1979,1980,1981,1982,
503200	C	1983,1984,1985,1986,1987,1988,1989,1990,1991,2020,
503201	N	1967,1972,1974,1976,1977,1979,1980,1981,1982,1983,
503202	N	1984,1985,1986,1987,1988,1989,1990,1991,2020,0000/
503203	C	
503204		DATA IERH12/
503205	H	1967,1969,1971,1974,1976,1977,1978,1980,1981,1983,
503206	H	1984,1985,1986,1987,1988,1989,1990,1991,2020,0000,
503207	C	1967,1969,1971,1974,1976,1977,1978,1980,1981,1983,
503208	C	1984,1985,1986,1987,1988,1989,1990,1991,2020,0000,
503209	N	1967,1972,1974,1976,1977,1978,1980,1981,1983,1984,
503210	N	1985,1986,1987,1988,1989,1990,1991,2020,0000,0000/
503211	C	
503212		DATA IERH13/
503213	H	1969,1973,1978,1980,1981,1983,1984,1985,1986,1987,
503214	H	1988,1989,1990,1991,2020,0000,0000,0000,0000,0000,
503215	C	1969,1973,1978,1980,1981,1983,1984,1985,1986,1987,
503216	C	1988,1989,1990,1991,2020,0000,0000,0000,0000,0000,
503217	N	1969,1973,1978,1980,1981,1983,1984,1985,1986,1987,
503218	N	1988,1989,1990,1991,2020,0000,0000,0000,0000,0000/
503219	C	
503220		DATA IERH14/
503221	H	1962,1969,1973,1974,1975,1976,1978,1979,1980,1983,
503222	H	1984,1985,1986,1989,1990,2000,2020,0000,0000,0000,
503223	C	1962,1969,1973,1974,1975,1976,1978,1979,1980,1983,
503224	C	1984,1985,1986,1989,1990,2000,2020,0000,0000,0000,
503225	N	1962,1969,1973,1974,1975,1976,1978,1979,1980,1983,
503226	N	1984,1985,1986,1989,1990,2000,2020,0000,0000,0000/
503227	C	
503228		DATA IERH15/
503229	H	1974,1976,1977,1978,1979,1981,1983,2020,0000,0000,
503230	H	0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
503231	C	1974,1976,1977,1978,1979,1981,1983,2020,0000,0000,

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```

503232 C 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
503233 N 1974,1976,1977,1978,1979,1980,1984,2020,0000,0000,
503234 N 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000/
503235 C
503236 DATA IERHI6/
503237 H 1977,1978,1980,1983,2020,0000,0000,0000,0000,0000,
503238 H 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
503239 C 1977,1978,1980,1983,2020,0000,0000,0000,0000,0000,
503240 C 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
503241 N 1977,1978,1979,1980,1984,1987,1989,2020,0000,0000,
503242 N 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000/
503243 C
503244 DATA IERHI7/
503245 H 1966,1968,1969,1970,1973,1976,1977,1978,1979,1981,
503246 H 1982,1983,1984,1985,1986,1987,1989,1990,2000,2020,
503247 C 1966,1968,1969,1970,1973,1976,1977,1978,1979,1981,
503248 C 1982,1983,1984,1985,1986,1987,1989,1990,2000,2020,
503249 N 1966,1968,1969,1970,1973,1976,1977,1978,1979,1981,
503250 N 1982,1983,1984,1985,1986,1987,1989,1990,2000,2020/
503251 C
503252 DATA IERHI8/
503253 H 1977,1979,1981,1984,1987,2020,0000,0000,0000,0000,
503254 H 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
503255 C 1977,1979,1981,2020,0000,0000,0000,0000,0000,0000,
503256 C 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
503257 N 1977,1979,2020,0000,0000,0000,0000,0000,0000,0000,
503258 N 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000/
503259 C
503260 DATA MAXERB/20/
503261 C
503262 C
503263 C /BASEQ4/:
503264 C
503265 C
503266 C Except for the limit on the total number of replacement ef parameter records,
503267 C the /BASEQ4/ block is initialized to dummy zeroes, since the cells either
503268 C get read in or assigned values or are not used.
503269 C
503270 DATA NEWPAR/500*0/,BERNEW/300*0.0/,NEWFIT/100*0/,NEWCT/0/
503271 DATA MAXCT/100/
503272 C
503273 C
503274 C /BASEQ6/:
503275 C
503276 C
503277 C Initialize all user supplied myg cases to 0, to allow IERPTR storage
503278 C algorithm to work, and NUMERU to 0, to allow storage and access algorithms
503279 C to work. KEYER and IGER are set as necessary by IERPTR.
503280 C
503281 DATA MYGERU/1152*0/,MAXERU/12/,NUMERU/48*0/,KEYER/1/,IGER/1/
503282 C
503283 END

```



```

504000      BLOCK DATA BD04
504001      C
504002      C BLOCK DATA Subprogram 04: /BASEQ1/,/BASEQ5/,/BASEQ7/
504003      C
504004      C BLOCK DATA 04 initializes the zero mile levels and deterioration rates
504005      C (intercepts & slopes) of the base FTP exhaust emission rate equations.
504006      C
504007      C Common block array subscripts:
504008      C
504009      C ERBDR(20,3,8,2) - ERBDR ( IGER, IP, IV, IR )
504010      C ERBZML(20,3,8,2) - ERBZML ( IGER, IP, IV, IR )
504011      C ERB50K(12,2,2) - ERB50K ( IG50, IP50, IR )
504012      C ERUDR(12,3,8,2) - ERUDR ( IGER, IP, IV, IR )
504013      C ERUZML(12,3,8,2) - ERUZML ( IGER, IP, IV, IR )
504014      C ERU50K(12,2,2) - ERU50K ( IG50, IP50, IR )
504015      C IPMOD(3) - IPMOD ( IP )
504016      C
504017      C Common block dictionary:
504018      C
504019      C      Name      Type      Description
504020      C      -----
504021      C Note: 3rd character syntax: B = Block Data hardcoded, U = User supplied
504022      C
504023      C /BASEQ1/:
504024      C
504025      C ERBZML  R      Hardcoded FTP Emission Rate (ER) equation zero mile levels
504026      C ERBDR   R      Hardcoded FTP ER equation deterioration rates
504027      C ERB50K  R      Hardcoded FTP ER equation deterioration rates 81+ LDGV HC/CO
504028      C
504029      C /BASEQ5/:
504030      C
504031      C ERUZML  R      User supplied (via NEWFLG) FTP ER equation zero mile levels
504032      C ERUDR   R      User supplied FTP ER equation deterioration rates
504033      C ERU50K  R      User supplied FTP ER equation deterioration rates, 81+ LDGV
504034      C
504035      C /BASEQ7/:
504036      C
504037      C IPMOD    I      Flag vector: for each IP whether or not 1 or more of its
504038      C                      FTP ER equation coefficient pairs have been supplied by the
504039      C                      user. 0 = no & 1 = yes (yes means idle ef skipped for 1 or
504040      C                      more IV means skip VIDLE(IP) calculation)
504041      C
504042      C Local array subscripts:
504043      C
504044      C <J><K><LL>(20,3,2) - <J><K><LL> ( IG, IP, IVER )
504045      C
504046      C where <J> = D (deterioration rate), Z (zero mile level)
504047      C          <K> = L (low altitude region), H (high altitude region)
504048      C          <LL> = 12 (LDGV,LDGT1), 34 (LDGT2,HDBGV), 56 (LDDV,LDDT), 78 (HDDV,MC)
504049      C          IVER = 1 (1st of vt pair LL), 2 (2nd of vt pair LL)
504050      C
504051      C Local array dictionary:
504052      C
504053      C      Name      Type      Descriptions
504054      C      -----
504055      C <J><K><LL>  R      as defined above, the slope/intercept <J> in region <K>
504056      C                      for vehicle type pair <LL> of the FTP exhaust emission
504057      C                      rate equation

```

Appendix C: MOBILE4 Block Data 04

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504058 C
 504059 C Notes:
 504060 C
 504061 C LDGV low and high altitude ERBDR and ERBZML are updated for MOBILE4 & 4.5.
 504062 C ERUZML and ERUDR added for MOBILE4. 1981+ LDGV HC/CO 50K+ updates were
 504063 C added for MOBILE4. LDGV low altitude ERBDR, ERBZML and ERB50K were
 504064 C were updated for MOBILE4. LDGT1/2 low & high altitude ERBDR & ERBZML were
 504065 C updated for MOBILE4. LDGV Z/DL HC & CO and Z/DH all IP were updated for
 504066 C MOBILE4. Low & high altitude MC Z/D were update for MOBILE4.
 504067 C
 504068 C
 504069 COMMON /BASEQ1/ ERBZML (20,3,8,2),ERBDR (20,3,8,2),ERB50K (12,2,2)
 504070 COMMON /BASEQ5/ ERUZML (12,3,8,2),ERUDR (12,3,8,2),ERU50K (12,2,2)
 504071 COMMON /BASEQ7/ IPMOD (3)
 504072 C
 504073 DIMENSION ZL12 (20,3,2),ZL34 (20,3,2),ZL56 (20,3,2),ZL78 (20,3,2)
 504074 DIMENSION ZH12 (20,3,2),ZH34 (20,3,2),ZH56 (20,3,2),ZH78 (20,3,2)
 504075 DIMENSION DL12 (20,3,2),DL34 (20,3,2),DL56 (20,3,2),DL78 (20,3,2)
 504076 DIMENSION DH12 (20,3,2),DH34 (20,3,2),DH56 (20,3,2),DH78 (20,3,2)
 504077 C
 504078 EQUIVALENCE
 504079 * (ERBZML (1,1,1,1),ZL12 (1,1,1)), (ERBZML (1,1,3,1),ZL34 (1,1,1)),
 504080 * (ERBZML (1,1,5,1),ZL56 (1,1,1)), (ERBZML (1,1,7,1),ZL78 (1,1,1)),
 504081 * (ERBZML (1,1,1,2),ZH12 (1,1,1)), (ERBZML (1,1,3,2),ZH34 (1,1,1)),
 504082 * (ERBZML (1,1,5,2),ZH56 (1,1,1)), (ERBZML (1,1,7,2),ZH78 (1,1,1))
 504083 C
 504084 EQUIVALENCE
 504085 * (ERBDR (1,1,1,1),DL12 (1,1,1)), (ERBDR (1,1,3,1),DL34 (1,1,1)),
 504086 * (ERBDR (1,1,5,1),DL56 (1,1,1)), (ERBDR (1,1,7,1),DL78 (1,1,1)),
 504087 * (ERBDR (1,1,1,2),DH12 (1,1,1)), (ERBDR (1,1,3,2),DH34 (1,1,1)),
 504088 * (ERBDR (1,1,5,2),DH56 (1,1,1)), (ERBDR (1,1,7,2),DH78 (1,1,1))
 504089 C
 504090 C Hardcoded FTP ER equation zero mile levels and deterioration (per 10000
 504091 C miles) rates are blocked by vehicle class. Within each block, the
 504092 C continuation code is the pollutant type: H = HC, C = CO and N = NOx.
 504093 C There are up to 2 lines and 20 cases per pollutant per vehicle class per
 504094 C region per equation parameter.
 504095 C
 504096 C
 504097 C /BASEQ1/:
 504098 C
 504099 C
 504100 C Hardcoded zero mile exhaust levels
 504101 C
 504102 C Low altitude region
 504103 C
 504104 DATA ZL12/
 504105 C LDGV
 504106 H 7.25, 4.43, 3.00, 3.38, 1.06, 0.36, 0.308,0.305,0.257,0.242,
 504107 H 0.254,0.265,0.264,0.267,0.269,0.271,0.275,0.278, 0.00, 0.00,
 504108 C 78.27,56.34,42.17,40.94,17.72, 6.09, 3.378,3.376,2.731,2.432,
 504109 C 2.611,2.764,2.720,2.757,2.785,2.813,2.870,2.915, 0.00, 0.00,
 504110 N 3.44, 4.35, 2.86, 2.44, 1.79, 1.50, 0.651,0.633,0.632,0.663,
 504111 N 0.651,0.641,0.647,0.646,0.644,0.642,0.638,0.635,0.000,0.000,
 504112 C LDGT1
 504113 H 7.25, 4.43, 3.00, 3.36, 1.80, 0.87, 0.82, 0.70, 0.41, 0.36,
 504114 H 0.31, 0.37, 0.37, 0.37, 0.37, 0.36, 4*0.,
 504115 C 78.27,56.34,42.17,40.78,24.55,12.28,12.58, 9.43, 7.03, 5.76,

504116 C 4.42, 5.29, 5.26, 5.22, 5.21, 5.07, 4*0.,
 504117 N 3.44, 4.35, 2.87, 2.70, 1.77, 1.64, 1.12, 1.24, 1.08, 0.91,
 504118 N 0.82, 0.82, 0.81, 0.81, 0.78, 5*0./
 504119 C
 504120 DATA ZL34/
 504121 C LDGT2
 504122 H 9.57, 6.28, 6.28, 0.87, 0.82, 0.70, 0.41, 0.36, 0.31, 0.37,
 504123 H 0.37, 0.37, 0.37, 0.36, 6*0.,
 504124 C93.98,60.08,60.08,12.28,12.58, 9.43, 7.03, 5.76, 4.42, 5.29,
 504125 C 5.26, 5.22, 5.21, 5.07, 6*0.,
 504126 N 5.44, 6.45, 4.61, 1.77, 1.64, 1.12, 1.24, 1.08, 0.91, 0.82,
 504127 N 0.82, 0.81, 0.81, 0.78, 6*0.,
 504128 C HDGV
 504129 H19.72,19.31, 9.73, 9.61, 8.88, 8.41, 7.20, 3.67, 3.45, 3.27,
 504130 H 3.26, 2.28, 2.00, 0.82, 0.82, 0.82, 0.81, 3*0.,
 504131 C240.22,235.25,166.26,164.30,151.70,143.73,123.05,57.18,53.77,
 504132 C 50.91, 50.75, 35.79, 28.21, 11.17, 11.14, 11.08, 11.03, 3*0.,
 504133 N 9.41, 9.22, 9.87, 7.11, 6.56, 6.22, 5.32, 5.95, 5.59, 5.30,
 504134 N 5.28, 5.21, 5.20, 5.21, 4.27, 3.54, 3.53, 3*0./
 504135 C
 504136 DATA ZL56/
 504137 C LDDV
 504138 H 1.31, 0.42, 0.42, 0.42, 0.42, 0.29,14*0.,
 504139 C 2.71, 1.17, 1.17, 1.17, 1.17, 1.15,14*0.,
 504140 N 1.46, 1.40, 1.40, 1.40, 1.40, 1.40, 1.31, 0.87,12*0.,
 504141 C LDDT
 504142 H 0.86, 0.86, 0.43, 17*0.,
 504143 C 1.97, 1.97, 1.33, 17*0.,
 504144 N 1.83, 1.83, 1.48, 1.07,1.03,15*0./
 504145 C
 504146 DATA ZL78/
 504147 C HDDV
 504148 H 3.54, 3.66, 3.78, 3.81, 3.91, 3.91, 3.99, 3.92, 3.51, 3.17,
 504149 H 2.78, 2.66, 2.82, 2.59, 2.28, 2.23, 2.18, 2.13, 2.10, 2.10,
 504150 C 10.32,10.69,11.04,11.13,11.42,11.42,11.65,11.44,14.04,12.67,
 504151 C 11.12,10.66,11.26,10.35,10.36,10.14,9.90,9.67,9.53,9.52,
 504152 N22.99,23.83,24.59,24.80,25.46,25.44,25.97,25.50,23.78,21.47,
 504153 N18.84,18.06,19.08,17.53,17.56,17.18,16.77,9.79,8.01,7.99,
 504154 C MC
 504155 H 8.78, 2.40, 1.93, 1.65, 1.31, 1.20,14*0.,
 504156 C33.42,24.39,17.51,17.40,16*0.,
 504157 N 0.25, 0.68, 0.85,17*0./
 504158 C
 504159 C High altitude region
 504160 C
 504161 DATA ZH12/
 504162 C LDGV
 504163 H 9.350, 5.600, 4.580, 4.620, 2.000, 0.930, 2.080, 0.780,
 504164 H 0.565, 0.446, 0.269, 0.242, 0.254, 0.265, 0.264, 0.267,
 504165 H 0.269, 0.271, 0.275, 0.278,
 504166 C117.700, 85.540, 79.640, 75.680, 47.030, 19.630, 41.830, 22.800,
 504167 C 12.532, 9.742, 3.280, 3.162, 3.217, 3.264, 3.242, 3.251,
 504168 C 3.259, 3.267, 3.284, 3.298,
 504169 N 1.960, 2.910, 1.920, 1.700, 1.370, 0.970, 0.820, 0.505,
 504170 N 0.627, 0.784, 0.789, 0.789, 0.789, 0.791, 0.791, 0.791,
 504171 N 0.791, 0.791, 0.791,1*0.,
 504172 C LDGT1
 504173 H 9.35, 5.60, 4.58, 4.58, 3.40, 1.60, 3.53, 1.66, 1.66, 1.07,

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504174	H	1.05, 0.51, 0.45, 0.39, 0.46, 0.46, 0.46, 0.45, 1*0.,
504175	C	117.70, 85.54, 79.64, 75.63, 58.01, 22.86, 53.57, 44.25, 44.25, 30.16,
504176	C	23.35, 9.84, 8.06, 6.19, 7.41, 7.36, 7.31, 7.29, 7.10, 1*0.,
504177	N	1.96, 2.91, 1.91, 1.88, 2.25, 1.88, 0.97, 0.97, 1.46, 1.22,
504178	N	1.24, 1.08, 0.91, 0.82, 0.82, 0.81, 0.81, 0.78, 2*0./
504179	C	
504180		DATA ZH34/
504181	C	LDGT2
504182	H	12.35, 8.56, 8.56, 1.66, 1.66, 1.07, 1.05, 0.51, 0.45, 0.39,
504183	H	0.46, 0.46, 0.46, 0.46, 0.45, 5*0.,
504184	C	141.35, 107.72, 107.72, 44.25, 44.25, 30.16, 23.35, 9.84, 8.06, 6.19,
504185	C	7.41, 7.36, 7.31, 7.29, 7.10, 5*0.,
504186	N	3.10, 4.32, 3.07, 0.97, 0.97, 1.46, 1.22, 1.24, 1.08, 0.91,
504187	N	0.82, 0.82, 0.81, 0.81, 0.78, 5*0.,
504188	C	HDBGV
504189	H	26.87, 26.32, 13.25, 13.10, 12.09, 11.46, 9.81, 5.00, 4.70, 4.45,
504190	H	4.44, 3.12, 2.73, 1.40, 1.39, 1.39, 1.38, 3*0.,
504191	C	430.72, 421.81, 298.10, 294.58, 272.00, 257.71, 220.63, 102.53, 96.41,
504192	C	91.29, 90.99, 64.16, 50.57, 30.62, 30.55, 30.38, 30.24, 3*0.,
504193	N	6.27, 6.14, 6.58, 4.74, 4.37, 4.14, 3.55, 3.97, 3.73, 3.53,
504194	N	3.52, 3.48, 3.47, 3.47, 3.41, 2.82, 2.81, 3*0./
504195	C	
504196		DATA ZH56/
504197	C	LDDV
504198	H	3.01, 0.97, 0.97, 0.97, 0.97, 0.67, 0.40, 0.29, 12*0.,
504199	C	4.74, 2.05, 2.05, 2.05, 2.05, 2.01, 2.01, 1.15, 12*0.,
504200	N	1.46, 1.40, 1.40, 1.40, 1.40, 1.40, 1.31, 0.87, 12*0.,
504201	C	LDDT
504202	H	1.98, 1.98, 1.98, 0.99, 0.54, 15*0.,
504203	C	3.45, 3.45, 3.45, 3.45, 2.33, 2.33, 14*0.,
504204	N	1.83, 1.83, 1.83, 1.83, 1.48, 1.48, 1.07, 1.03, 12*0./
504205	C	
504206		DATA ZH78/
504207	C	HDDV
504208	H	8.13, 8.43, 8.70, 8.77, 9.01, 9.00, 9.19, 9.02, 8.07, 7.28,
504209	H	6.37, 6.13, 6.47, 5.95, 5.25, 5.14, 5.01, 4.90, 4.83, 4.82,
504210	C	18.05, 18.71, 19.30, 19.47, 19.99, 19.97, 20.38, 20.01, 24.56, 22.17,
504211	C	19.39, 18.65, 19.71, 18.11, 18.13, 17.75, 17.32, 16.92, 16.68, 16.66,
504212	N	22.99, 23.83, 24.59, 24.80, 25.46, 25.44, 25.97, 25.50, 23.78, 21.47,
504213	N	18.77, 18.06, 19.08, 17.53, 17.56, 17.18, 16.77, 9.79, 8.01, 7.99,
504214	C	MC
504215	H	11.43, 3.02, 2.95, 2.52, 2.00, 1.84, 0.00, 0.00, 12*0.00,
504216	C	50.13, 37.07, 33.09, 32.89, 0.00, 0.00, 0.00, 0.00, 12*0.00,
504217	N	0.14, 0.45, 0.57, 0.00, 0.00, 0.00, 0.00, 0.00, 12*0.00/
504218	C	
504219	C	Hardcoded deterioration rates
504220	C	
504221	C	Low altitude region
504222	C	
504223		DATA DL12/
504224	C	LDGV
504225	H	0.18, 0.25, 0.37, 0.16, 0.28, 0.10, 0.079, 0.074, 0.062, 0.067,
504226	H	0.063, 0.060, 0.060, 0.059, 0.059, 0.058, 0.057, 0.056, 0.00, 0.00,
504227	C	2.25, 2.55, 3.13, 2.35, 2.46, 0.73, 1.147, 1.079, 0.760, 0.840,
504228	C	0.803, 0.771, 0.786, 0.780, 0.774, 0.769, 0.757, 0.748, 0.00, 0.00,
504229	N	0.00, 0.00, 0.05, 0.04, 0.11, 0.07, 0.067, 0.071, 0.039, 0.035,
504230	N	0.035, 0.035, 0.034, 0.034, 0.034, 0.034, 0.034, 0.034, 0.000, 0.000,
504231	C	LDGT1

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504232	H	0.18, 0.25, 0.37, 0.17, 0.27, 0.28, 0.15, 0.15, 0.08, 0.08,
504233	H	0.08, 0.08, 0.08, 0.08, 0.08, 0.08, 4*0.,
504234	C	2.25, 2.55, 3.13, 2.44, 2.59, 2.43, 1.46, 1.46, 0.73, 0.73,
504235	C	0.73, 0.73, 0.73, 0.73, 0.73, 0.73, 4*0.,
504236	N	0.00, 0.00, 0.04, 0.03, 0.06, 0.03, 0.07, 0.04, 0.04, 0.04,
504237	N	0.04, 0.04, 0.04, 0.04, 0.04, 5*0./
504238	C	
504239		DATA DL34/
504240	C	LDGT2
504241	H	0.18, 0.25, 0.17, 0.28, 0.15, 0.15, 0.08, 0.08, 0.08, 0.08,
504242	H	0.08, 0.08, 0.08, 0.08, 6*0.0,
504243	C	2.25, 2.55, 2.44, 2.43, 1.46, 1.46, 0.73, 0.73, 0.73, 0.73,
504244	C	0.73, 0.73, 0.73, 0.73, 6*0.0,
504245	N	0.00, 0.00, 0.04, 0.06, 0.03, 0.07, 0.04, 0.04, 0.04, 0.04,
504246	N	0.04, 0.04, 0.04, 0.04, 6*0.0,
504247	C	HdGV
504248	H	0.37, 0.36, 0.39, 0.26, 0.24, 0.22, 0.19, 0.18, 0.17, 0.16,
504249	H	0.16, 0.05, 0.05, 0.09, 0.09, 0.09, 0.09, 3*0.,
504250	C	5.76, 5.64, 7.05, 6.67, 6.16, 5.83, 4.99, 4.79, 4.51, 4.27,
504251	C	4.25, 0.86, 0.86, 0.64, 0.64, 0.64, 0.64, 3*0.,
504252	N	0.00, 0.00, 0.00, 0.09, 0.08, 0.07, 0.06, 0.06, 0.06, 0.05,
504253	N	0.05, 0.03, 0.03, 0.03, 0.04, 0.04, 0.04, 3*0./
504254	C	
504255		DATA DL56/
504256	C	LDDV
504257	H	0.08, 0.07, 0.07, 0.07, 0.07, 0.03, 14*0.,
504258	C	0.13, 0.09, 0.09, 0.09, 0.09, 0.04, 14*0.,
504259	N	0.04, 0.04, 0.04, 0.04, 0.04, 0.04, 0.03, 0.03, 12*0.,
504260	C	LDDT
504261	H	0.08, 0.08, 0.04, 17*0.,
504262	C	0.10, 0.10, 0.04, 17*0.,
504263	N	0.08, 0.08, 0.03, 0.03, 0.03, 15*0./
504264	C	
504265		DATA DL78/
504266	C	HDDV
504267	H	0.06, 0.06, 0.06, 0.06, 0.06, 0.06, 0.06, 0.06, 0.00, 0.00,
504268	H	0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00,
504269	C	0.14, 0.15, 0.15, 0.15, 0.16, 0.16, 0.16, 0.16, 0.12, 0.11,
504270	C	0.10, 0.09, 0.10, 0.09, 0.09, 0.09, 0.08, 0.08, 0.08, 0.08,
504271	N	0.17, 0.18, 0.18, 0.19, 0.19, 0.19, 0.19, 0.19, 0.00, 0.00,
504272	N	0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00,
504273	C	MC
504274	H	0.75, 1.44, 1.15, 0.95, 0.75, 0.70, 14*0.,
504275	C	3.22, 3.56, 2.53, 2.46, 16*0.,
504276	N	0.03, 0.00, 0.00, 17*0./
504277	C	
504278	C	High altitude region
504279	C	
504280		DATA DH12/
504281	C	LDGV
504282	H	0.180, 0.250, 0.370, 0.160, 0.280, 0.280, 0.280, 0.100,
504283	H	0.079, 0.074, 0.062, 0.067, 0.063, 0.060, 0.060, 0.059,
504284	H	0.059, 0.058, 0.057, 0.056,
504285	C	2.250, 2.550, 3.130, 2.350, 2.460, 2.460, 2.460, 0.730,
504286	C	1.147, 1.079, 0.760, 0.840, 0.803, 0.771, 0.786, 0.780,
504287	C	0.774, 0.769, 0.757, 0.748,
504288	N	0.000, 0.000, 0.050, 0.040, 0.110, 0.110, 0.070, 0.067,
504289	N	0.071, 0.039, 0.035, 0.035, 0.035, 0.034, 0.034, 0.034,

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504290      N 0.034, 0.034, 0.034,1*0.,
504291      C LDGT1
504292      H 0.18, 0.25, 0.37, 0.17, 0.27, 0.27, 0.27, 0.28, 0.28, 0.15,
504293      H 0.15, 0.08, 0.08, 0.08, 0.08, 0.08, 0.08, 0.08, 0.08, 1*0.,
504294      C 2.25, 2.25, 3.13, 2.44, 2.59, 2.59, 2.59, 2.43, 2.43, 1.46,
504295      C 1.46, 0.73, 0.73, 0.73, 0.73, 0.73, 0.73, 0.73, 0.73, 1*0.,
504296      N 0.0 , 0.0 , 0.04, 0.03, 0.03, 0.03, 0.06, 0.06, 0.03, 0.07,
504297      N 0.04, 0.04, 0.04, 0.04, 0.04, 0.04, 0.04, 0.04, 2*0./
504298      C
504299      DATA DH34/
504300      C LDGT2
504301      H 0.18, 0.25, 0.17, 0.28, 0.28, 0.15, 0.15, 0.08, 0.08, 0.08,
504302      H 0.08, 0.08, 0.08, 0.08, 0.08, 5*0.,
504303      C 2.25, 2.55, 2.44, 2.43, 2.43, 1.46, 1.46, 0.73, 0.73, 0.73,
504304      C 0.73, 0.73, 0.73, 0.73, 0.73, 5*0.,
504305      N 0.0 , 0.0 , 0.04, 0.06, 0.06, 0.03, 0.07, 0.04, 0.04, 0.04,
504306      N 0.04, 0.04, 0.04, 0.04, 0.04, 5*0.,
504307      C HDGV
504308      H 0.37, 0.36, 0.39, 0.26, 0.24, 0.22, 0.19, 0.18, 0.17, 0.16,
504309      H 0.16, 0.05, 0.05, 0.09, 0.09, 0.09, 0.09, 3*0.,
504310      C 5.76, 5.64, 7.05, 6.67, 6.16, 5.83, 4.99, 4.79, 4.51, 4.27,
504311      C 4.25, 0.86, 0.86, 0.64, 0.64, 0.64, 0.64, 3*0.,
504312      N 0.00, 0.00, 0.00, 0.09, 0.08, 0.07, 0.06, 0.06, 0.06, 0.05,
504313      N 0.05, 0.03, 0.03, 0.03, 0.04, 0.04, 0.04, 3*0./
504314      C
504315      DATA DH56/
504316      C LDDV
504317      H 0.08, 0.07, 0.07, 0.07, 0.07, 0.03, 0.03, 0.03,12*0.,
504318      C 0.13, 0.09, 0.09, 0.09, 0.09, 0.04, 0.04, 0.04,12*0.,
504319      N 0.04, 0.04, 0.04, 0.04, 0.04, 0.04, 0.03, 0.03,12*0.,
504320      C LDDT
504321      H 0.08, 0.08, 0.08, 0.04, 0.04, 15*0.,
504322      C 0.10, 0.10, 0.10, 0.10, 0.04, 0.04, 14*0.,
504323      N 0.06, 0.06, 0.06, 0.06, 0.03, 0.03, 0.03, 0.03, 12*0./
504324      C
504325      DATA DH78/
504326      C HDDV
504327      H 0.06, 0.06, 0.06, 0.06, 0.06, 0.06, 0.06, 0.06, 0.00, 0.00,
504328      H 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00,
504329      C 0.14, 0.15, 0.15, 0.15, 0.16, 0.16, 0.16, 0.16, 0.12, 0.11,
504330      C 0.09, 0.09, 0.10, 0.09, 0.09, 0.09, 0.08, 0.08, 0.08, 0.08,
504331      N 0.17, 0.18, 0.18, 0.19, 0.19, 0.19, 0.19, 0.19, 0.00, 0.00,
504332      N 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00,
504333      C MC
504334      H 0.75, 1.44, 1.15, 0.95, 0.75, 0.70, 0.00, 0.00, 0.00,11*0.,
504335      C 3.22, 3.56, 2.53, 2.46, 0.00, 0.00, 0.00, 0.00, 0.00,11*0.,
504336      N 0.03, 0.0 , 0.0 , 0.00, 0.00, 0.00, 0.00, 0.00, 0.00,11*0./
504337      C
504338      DATA ERB50K/
504339      C Low altitude
504340      H 0.108,0.101,0.085,0.088,0.084,0.081,
504341      H 0.081,0.080,0.079,0.078,0.077,0.076,
504342      C 1.765,1.616,1.013,1.052,1.014,0.982,
504343      C 0.983,0.973,0.967,0.961,0.949,0.939,
504344      C High altitude
504345      H 0.108,0.101,0.085,0.088,0.084,0.081,
504346      H 0.081,0.080,0.079,0.078,0.077,0.076,
504347      C 1.765,1.616,1.013,1.052,1.014,0.982,

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504348      C  0.983,0.973,0.967,0.961,0.949,0.939/
504349      C
504350      C
504351      C  /BASEQ5/:
504352      C
504353      C
504354      C  User supplied zero mile levels and deterioration rates arrays are
504355      C  initialized to all zeroes.
504356      C
504357      C      DATA ERUZML/576*0.0/,ERUDR/576*0.0/,ERU50K/48*0.0/
504358      C
504359      C
504360      C  /BASEQ7/:
504361      C
504362      C
504363      C  IPMOD starts all zeroes ( = all "no mods" ).
504364      C
504365      C      DATA IPMOD/3*0/
504366      C
504367      C      END
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505000      BLOCK DATA BD05
505001      C
505002      C BLOCK DATA Subprogram 05: /IDLEQ1/,/IDLEQ2/,/IDLEQ3/
505003      C
505004      C BLOCK DATA 05 initializes the zero mile levels (zmls) & deterioration rates
505005      C (drs) (intercepts & slopes) and model year groups (mygs) of the idle exhaust
505006      C emission rate equations. BD05 also initializes the untampered idle
505007      C offset values.
505008      C
505009      C Common block array subscripts:
505010      C
505011      C DRIDL(15,3,8,2) - DRIDL ( IG, IP, IV, IR )
505012      C MYGIDL(15,3,8,2) - MYGIDL ( IG, IP, IV, IR )
505013      C ZMLIDL(15,3,8,2) - ZMLIDL ( IG, IP, IV, IR )
505014      C UTIDOF(14,3,2) - UTIDOF ( IG, IP, IV )
505015      C
505016      C Common block dictionary:
505017      C
505018      C      Name      Type      Description
505019      C      -----
505020      C /IDLEQ1/:
505021      C
505022      C ZMLIDL  R      idle exhaust zero mile emission levels
505023      C DRIDL   R      idle exhaust deterioration rates
505024      C
505025      C /IDLEQ2/:
505026      C
505027      C MYGIDL  I      myg upper bounds for idle emission rate equation
505028      C                      intercept & slope arrays (ZMLIDL, DRIDL)
505029      C MAXIDL  I      maximum no. of idle ef mygs for any IP x IV x IR case
505030      C
505031      C /IDLEQ3/:
505032      C
505033      C UTIDOF  R      untampered HC & CO idle offset & NOx average idle ef values
505034      C
505035      C Local array subscripts:
505036      C
505037      C For zmls & drs:
505038      C
505039      C I<J><K><L>(15,3,2) - I<J><K><L> ( IG, IP, IVER )
505040      C
505041      C where <J> = Z (zero mile level), D (deterioration rate)
505042      C          <K> = L (low altitude region), H (high altitude region)
505043      C          <L> = 1 (LDGV,LDGT1), 2 (LDGT2,HDGV), 3 (LDDV,LDDT), 4 (HDDV,MC)
505044      C          IVER = 1 (1st of vt pair K), 2 (2nd of vt pair K)
505045      C
505046      C For mygs:
505047      C
505048      C IDLLO<IV>(15,3) - IDLLO<IV> ( IG, IP )
505049      C IDLHI<IV>(15,3) - IDLHI<IV> ( IG, IP )
505050      C
505051      C Local array dictionary:
505052      C
505053      C      Name      Type      Descriptions
505054      C      -----
505055      C I<J><K><L>  R      as defined above, the intercept/slope <J> in region <K>
505056      C                      for vehicle type pair <L> of the idle exhaust emission
505057      C                      rate equation

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505058 C IDLL0<IV> 1 low altitude myg upper bounds for IDLE ERs
505059 C IDLH1<IV> 1 high altitude myg upper bounds for IDLE ERs
505060 C
505061 C Notes:
505062 C
505063 C BD 05 was updated for MOBILE4.
505064 C BD 05 was modified for MOBILE4 with the addition of untampered
505065 C idle offsets.
505066 C
505067 C
505068 COMMON /IDLEQ1/ ZMLIDL(15,3,8,2),DRIDL(15,3,8,2)
505069 COMMON /IDLEQ2/ MYGIDL(15,3,8,2),MAXIDL
505070 COMMON /IDLEQ3/ UTIDOF(14,3,2)
505071 C
505072 REAL IZL1(15,3,2),IZL2(15,3,2),IZL3(15,3,2),IZL4(15,3,2)
505073 REAL IZH1(15,3,2),IZH2(15,3,2),IZH3(15,3,2),IZH4(15,3,2)
505074 REAL IDL1(15,3,2),IDL2(15,3,2),IDL3(15,3,2),IDL4(15,3,2)
505075 REAL IDH1(15,3,2),IDH2(15,3,2),IDH3(15,3,2),IDH4(15,3,2)
505076 C
505077 EQUIVALENCE
505078 * (ZMLIDL(1,1,1,1),IZL1(1,1,1)), (ZMLIDL(1,1,3,1),IZL2(1,1,1)),
505079 * (ZMLIDL(1,1,5,1),IZL3(1,1,1)), (ZMLIDL(1,1,7,1),IZL4(1,1,1)),
505080 * (ZMLIDL(1,1,1,2),IZH1(1,1,1)), (ZMLIDL(1,1,3,2),IZH2(1,1,1)),
505081 * (ZMLIDL(1,1,5,2),IZH3(1,1,1)), (ZMLIDL(1,1,7,2),IZH4(1,1,1))
505082 C
505083 EQUIVALENCE
505084 * (DRIDL(1,1,1,1),IDL1(1,1,1)), (DRIDL(1,1,3,1),IDL2(1,1,1)),
505085 * (DRIDL(1,1,5,1),IDL3(1,1,1)), (DRIDL(1,1,7,1),IDL4(1,1,1)),
505086 * (DRIDL(1,1,1,2),IDH1(1,1,1)), (DRIDL(1,1,3,2),IDH2(1,1,1)),
505087 * (DRIDL(1,1,5,2),IDH3(1,1,1)), (DRIDL(1,1,7,2),IDH4(1,1,1))
505088 C
505089 DIMENSION
505090 * IDLL01(15,3),
505091 * IDLL02(15,3),
505092 * IDLL03(15,3),
505093 * IDLL04(15,3),
505094 * IDLL05(15,3),
505095 * IDLL06(15,3),
505096 * IDLL07(15,3),
505097 * IDLL08(15,3)
505098 C
505099 EQUIVALENCE
505100 * (MYGIDL(1,1,1,1),IDLL01(1,1)),
505101 * (MYGIDL(1,1,2,1),IDLL02(1,1)),
505102 * (MYGIDL(1,1,3,1),IDLL03(1,1)),
505103 * (MYGIDL(1,1,4,1),IDLL04(1,1)),
505104 * (MYGIDL(1,1,5,1),IDLL05(1,1)),
505105 * (MYGIDL(1,1,6,1),IDLL06(1,1)),
505106 * (MYGIDL(1,1,7,1),IDLL07(1,1)),
505107 * (MYGIDL(1,1,8,1),IDLL08(1,1))
505108 C
505109 DIMENSION
505110 * IDLH11(15,3),
505111 * IDLH12(15,3),
505112 * IDLH13(15,3),
505113 * IDLH14(15,3),
505114 * IDLH15(15,3),
505115 * IDLH16(15,3),

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505116      *   IDLH17(15,3),
505117      *   IDLH18(15,3)
505118      C
505119      EQUIVALENCE
505120      *   (MYGIDL(1,1,1,2),IDLH11(1,1)),
505121      *   (MYGIDL(1,1,2,2),IDLH12(1,1)),
505122      *   (MYGIDL(1,1,3,2),IDLH13(1,1)),
505123      *   (MYGIDL(1,1,4,2),IDLH14(1,1)),
505124      *   (MYGIDL(1,1,5,2),IDLH15(1,1)),
505125      *   (MYGIDL(1,1,6,2),IDLH16(1,1)),
505126      *   (MYGIDL(1,1,7,2),IDLH17(1,1)),
505127      *   (MYGIDL(1,1,8,2),IDLH18(1,1))
505128      C
505129      C
505130      C /IDLEQ1/:
505131      C
505132      C
505133      C Idle exhaust emission zero mile levels and deterioration (per 10000 miles)
505134      C rates. 1-2 lines per pollutant for each vehicle type, as indicated by the
505135      C continuation line characters (H,C,N for HC, CO & NOx, respectively).
505136      C
505137      C Zero mile levels
505138      C
505139      C Apparent duplicate zml's are in fact paired with differing dr's & viceversa.
505140      C
505141      C Low altitude region
505142      C
505143      DATA IZL1/
505144      C LDGV
505145      H 79.20, 64.20, 32.40, 43.20, 18.00, 14.22, 1.92, 4.56, 4.44,
505146      H 5.16, 5.10, 5.28, 4.92, 4.86, 0.0,
505147      C825.60,839.40,710.40,759.60,360.0,189.60, 6.00,20.40,21.90,
505148      C 13.20, 11.64, 13.32, 13.08, 13.68, 0.0,
505149      N 5.40, 10.20, 8.40, 15.60, 3.60, 2.89, 2.44, 2.36, 2.18,
505150      N 1.94, 1.83, 1.37, 1.22, 2*0.0,
505151      C LDGT1
505152      H 79.20, 64.20, 32.40, 43.20, 22.20, 12.12, 11.22, 4.32, 7.32,
505153      H 6*0.0,
505154      C825.60,839.40,710.40,759.60,376.20, 91.80, 91.80, 117.78,
505155      C 26.04, 22.32, 5*0.0,
505156      N 5.40, 10.20, 8.40, 3.60, 2.36, 1.47, 9*0.0/
505157      C
505158      DATA IZL2/
505159      C LDGT2
505160      H 100.2, 63.6, 63.6, 12.12, 11.22, 4.32, 7.32, 8*0.0,
505161      C1138.8,691.8,691.8, 91.8, 117.78, 26.04,22.32, 8*0.0,
505162      N 4.8, 6.0, 4.2, 3.6, 2.36, 1.47, 9*0.0,
505163      C HDGV
505164      H 137.4, 51.0, 51.0, 25.8, 25.8, 6.0, 6.0, 8*0.0,
505165      C1330.8,1330.8,369.0,369.0,385.2, 42.0, 20.4, 8*0.0,
505166      N 2.4, 3.0, 3.6, 4.2, 0.6, 10*0./
505167      C
505168      DATA IZL3/
505169      C LDDV
505170      H 8.40, 1.80, 2.40, 3.60, 3.00, 1.80, 9*0.0,
505171      C13.80, 8.40, 9.60,10.20,10.80, 9.00, 9*0.0,
505172      N 7.80,13.20,10.20,12.00,10.80,11.40, 8.40, 5.40, 7*0.0,
505173      C LDDT

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505174 H 4.80, 6.00, 4.20, 12*0.0,
 505175 C18.00,18.60,18.60, 12*0.0,
 505176 N11.40,19.20,20.40, 7.80,11*0./
 505177 C
 505178 DATA IZL4/
 505179 C HDDV
 505180 H 21.6, 16.2, 13*0.0,
 505181 C 40.2, 14*0.0,
 505182 N 55.2, 13.2, 13*0.0,
 505183 C MC
 505184 H117.0, 44.4, 35.4,12*0.0,
 505185 C259.8,175.2,140.4,12*0.0,
 505186 N 0.6, 1.8, 2.4,12*0./
 505187 C
 505188 C High altitude region
 505189 C
 505190 DATA IZH1/
 505191 C LDGV
 505192 H 97.80, 45.60, 42.60, 44.40, 16.20, 29.30, 3.81, 7.24, 7.31,
 505193 H 7.65, 7.10, 7.43, 6.88, 6.83, 0.0,
 505194 C 958.80,674.40,775.80,839.40,445.20,233.50, 35.70,27.47,
 505195 C 27.47, 26.64, 19.48, 22.24, 21.91, 22.85, 0.0,
 505196 N 6.60, 5.40, 4.20, 2.39, 1.36, 1.29, 1.34, 1.27,
 505197 N 1.02, 0.92, 5*0.0,
 505198 C LDGT1
 505199 H 97.80, 45.60, 42.60, 44.40, 19.80, 9.00, 18.0, 33.06,
 505200 H 33.06, 12.74, 21.59, 4*0.0,
 505201 C 958.80,674.40,775.80,839.40,465.60,180.0,363.00,225.50,
 505202 C 225.50, 50.0, 42.85, 4*0.0,
 505203 N 6.60, 5.40, 4.20, 2.39, 1.36, 1.34, 9*0.0/
 505204 C
 505205 DATA IZH2/
 505206 C LDGT2
 505207 H 123.60, 65.40, 65.40, 33.06, 33.06, 12.74, 21.59, 8*0.0,
 505208 C1322.40,764.40,764.40,225.50,225.50, 50.0, 42.85, 8*0.0,
 505209 N 6.0, 3.0, 2.4, 2.39, 1.36, 1.34, 9*0.0,
 505210 C HDGV
 505211 H 169.8, 52.2, 52.2, 26.4, 13.8, 7.2, 9*0.0,
 505212 C1545.0, 408.0, 408.0, 425.4, 72.6, 29.4, 9*0.0,
 505213 N 3.0, 1.8, 4.2, 0.6, 11*0.0/
 505214 C
 505215 DATA IZH3/
 505216 C LDDV
 505217 H 19.2, 4.2, 5.4, 8.4, 7.2, 4.2, 2.4, 1.8, 7*0.0,
 505218 C 24.0, 15.0, 16.8, 18.0, 19.2, 15.6, 9.0, 8*0.0,
 505219 N 7.8, 13.2, 10.2, 7.80, 10.8, 11.4, 8.4, 5.4, 7*0.0,
 505220 C LDDT
 505221 H 10.8, 13.8, 4.2, 12*0.0,
 505222 C 31.8, 32.4, 32.4, 18.6, 11*0.0,
 505223 N 11.4, 19.2, 20.4, 7.8, 11*0./
 505224 C
 505225 DATA IZH4/
 505226 C HDDV
 505227 H 49.8, 37.2, 13*0.0,
 505228 C 70.2, 14*0.0,
 505229 N 55.2, 13.2, 13*0.0,
 505230 C MC
 505231 H 144.6, 31.8, 46.8, 12*0.0,

505232 C 301.8, 140.4, 153.6, 12*0.0,
 505233 N 0.6, 1.2, 13*0./
 505234 C
 505235 C Deterioration rates
 505236 C
 505237 C Low altitude region
 505238 C
 505239 DATA IDL1/
 505240 C LDGV
 505241 H 1.80, 3.60, 4.20, 4.20, 4.20, 3.90, 0.84, 1.56, 1.56, 1.50,
 505242 H 1.38, 1.20, 0.90, 0.72, 0.0,
 505243 C24.00,37.80,52.80,45.60,51.00,27.96, 4.20,15.24,14.70,15.72,
 505244 C16.38,15.66,12.84,11.16, 0.0,
 505245 N 15*0.0,
 505246 C LDGT1
 505247 H 1.80, 3.60, 4.20, 2.40, 3.60, 3.60, 2.88, 1.68, 0.42, 6*0.0,
 505248 C24.00,37.80,52.80,45.60,43.20,34.92,34.92,11.10,16.44, 7.86,
 505249 C 5*0.0,
 505250 N 15*0./
 505251 C
 505252 DATA IDL2/
 505253 C LDGT2
 505254 H 1.80, 2.40, 1.80, 3.60, 2.88, 1.68, 0.42, 8*0.0,
 505255 C27.00,31.20,29.40,34.92,11.10,16.44, 7.86, 8*0.0,
 505256 N 15*0.0,
 505257 C HDGV
 505258 H 2.40, 2.40, 1.20, 1.20, 1.80, 1.80, 1.80, 8*0.0,
 505259 C31.80,31.80,16.80,16.20,16.80, 8.40,10.80, 8*0.0,
 505260 N 15*0./
 505261 C
 505262 DATA IDL3/
 505263 C LDDV
 505264 H 0.60, 14*0.0,
 505265 C 0.60, 0.60, 0.60, 0.60, 0.60, 0.60, 9*0.0,
 505266 N 0.0, 0.0, 0.60, 0.60, 0.60, 0.60, 0.60, 0.60, 7*0.0,
 505267 C LDDT
 505268 H 0.60, 0.60, 0.60, 12*0.0,
 505269 C 1.20, 0.60, 0.60, 12*0.0,
 505270 N 0.60, 0.60, 0.60, 0.60,11*0./
 505271 C
 505272 DATA IDL4/
 505273 C HDDV
 505274 H 15*0.0,
 505275 C 0.60, 14*0.0,
 505276 N 15*0.0,
 505277 C MC
 505278 H25.20,21.60,22.80,12*0.0,
 505279 C13.80,30.0,15.60,12*0.0,
 505280 N 15*0.0/
 505281 C
 505282 C High altitude region
 505283 C
 505284 DATA IDH1/
 505285 C LDGV
 505286 H 1.80, 3.60, 4.20, 2.40, 4.20, 3.48, 1.17, 1.54, 1.48,
 505287 H 1.49, 1.37, 1.20, 0.88, 0.73, 0.0,
 505288 C24.00,37.80,52.80,45.60,51.00,13.08, 3.05,15.25,14.72,
 505289 C15.69,16.38,15.68,12.82,11.18, 0.0,

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505290      N 15*0.0,
505291      C LDGT1
505292      H 1.80, 3.60, 4.20, 2.40, 3.60, 3.60, 3.60, 3.59, 2.86,
505293      H 1.68, 0.06, 4*0.0,
505294      C24.00,37.80,52.80,45.60,43.20,43.20,43.20,34.91,11.10,
505295      C16.44, 7.86, 4*0.0,
505296      N 15*0./
505297      C
505298      DATA IDH2/
505299      C LDGT2
505300      H 1.80, 2.40, 1.80, 3.59, 2.86, 1.68, 0.06, 8*0.0,
505301      C27.00,31.20,29.40,34.91,11.10,16.44, 7.86, 8*0.0,
505302      N 15*0.0,
505303      C HDGV
505304      H 2.40, 2.40, 1.20, 0.60, 1.80, 2.40, 9*0.0,
505305      C31.80,16.80,16.20,16.80, 8.40,16.80, 9*0.0,
505306      N 15*0./
505307      C
505308      DATA IDH3/
505309      C LDDV
505310      H 0.60, 14*0.0,
505311      C 0.60, 0.60, 0.60, 0.60, 0.60, 0.60, 0.60, 8*0.0,
505312      N 0.0 , 0.0 , 0.60, 0.60, 0.60, 0.60, 0.60, 0.60, 7*0.0,
505313      C LDDT
505314      H 0.60, 0.60, 0.60, 12*0.0,
505315      C 1.20, 1.20, 0.60, 0.60, 11*0.0,
505316      N 0.60, 0.60, 0.60, 0.60, 11*0.0/
505317      C
505318      DATA IDH4/
505319      C HDDV
505320      H 15*0.0,
505321      C 0.60, 14*0.0,
505322      N 15*0.0,
505323      C MC
505324      H25.20,21.60,22.80, 12*0.0,
505325      C13.80,30.0,15.60, 12*0.0,
505326      N 15*0.0/
505327      C
505328      C
505329      C /IDLEQ2/:
505330      C
505331      C
505332      C mygs for low altitude idle emission rates
505333      C
505334      DATA IDLL01/
505335      H 1967,1969,1971,1974,1976,1979,1980,1981,1982,1983,
505336      H 1984,1986,1989,2020,0000,
505337      C 1967,1969,1971,1974,1976,1979,1980,1981,1982,1983,
505338      C 1984,1986,1989,2020,0000,
505339      N 1967,1972,1974,1976,1979,1980,1981,1982,1983,1984,
505340      N 1986,1989,2020,0000,0000/
505341      C
505342      DATA IDLL02/
505343      H 1967,1969,1971,1974,1976,1981,1983,1987,2020,0000,
505344      H 0000,0000,0000,0000,0000,
505345      C 1967,1969,1971,1974,1978,1980,1981,1983,1987,2020,
505346      C 0000,0000,0000,0000,0000,
505347      N 1967,1972,1974,1983,1987,2020,0000,0000,0000,0000,

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Appendix C: MOBILE4 Block Data 05

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505348	N	0000,0000,0000,0000,0000/
505349	C	
505350		DATA IDLL03/
505351	H	1969,1973,1976,1981,1983,1987,2020,0000,0000,0000,
505352	H	0000,0000,0000,0000,0000,
505353	C	1969,1973,1978,1981,1983,1987,2020,0000,0000,0000,
505354	C	0000,0000,0000,0000,0000,
505355	N	1969,1973,1978,1983,1987,2020,0000,0000,0000,0000,
505356	N	0000,0000,0000,0000,0000/
505357	C	
505358		DATA IDLL04/
505359	H	1969,1973,1978,1982,1984,1985,2020,0000,0000,0000,
505360	H	0000,0000,0000,0000,0000,
505361	C	1962,1969,1973,1978,1983,1984,2020,0000,0000,0000,
505362	C	0000,0000,0000,0000,0000,
505363	N	1969,1973,1983,1984,2020,0000,0000,0000,0000,0000,
505364	N	0000,0000,0000,0000,0000/
505365	C	
505366		DATA IDLL05/
505367	H	1974,1976,1977,1978,1979,2020,0000,0000,0000,0000,
505368	H	0000,0000,0000,0000,0000,
505369	C	1974,1976,1977,1978,1979,2020,0000,0000,0000,0000,
505370	C	0000,0000,0000,0000,0000,
505371	N	1974,1976,1977,1978,1979,1980,1984,2020,0000,0000,
505372	N	0000,0000,0000,0000,0000/
505373	C	
505374		DATA IDLL06/
505375	H	1977,1980,2020,0000,0000,0000,0000,0000,0000,0000,
505376	H	0000,0000,0000,0000,0000,
505377	C	1977,1980,2020,0000,0000,0000,0000,0000,0000,0000,
505378	C	0000,0000,0000,0000,0000,
505379	N	1977,1980,1986,2020,0000,0000,0000,0000,0000,0000,
505380	N	0000,0000,0000,0000,0000/
505381	C	
505382		DATA IDLL07/
505383	H	1984,2020,0000,0000,0000,0000,0000,0000,0000,0000,
505384	H	0000,0000,0000,0000,0000,
505385	C	2020,0000,0000,0000,0000,0000,0000,0000,0000,0000,
505386	C	0000,0000,0000,0000,0000,
505387	N	1984,2020,0000,0000,0000,0000,0000,0000,0000,0000,
505388	N	0000,0000,0000,0000,0000/
505389	C	
505390		DATA IDLL08/
505391	H	1977,1979,2020,0000,0000,0000,0000,0000,0000,0000,
505392	H	0000,0000,0000,0000,0000,
505393	C	1977,1979,2020,0000,0000,0000,0000,0000,0000,0000,
505394	C	0000,0000,0000,0000,0000,
505395	N	1977,1979,2020,0000,0000,0000,0000,0000,0000,0000,
505396	N	0000,0000,0000,0000,0000/
505397	C	
505398	C	mygs for high altitude idle emission rates
505399	C	
505400		DATA IDLH11/
505401	H	1967,1969,1971,1974,1976,1979,1980,1981,1982,1983,
505402	H	1984,1986,1989,2020,0000,
505403	C	1967,1969,1971,1974,1976,1979,1980,1981,1982,1983,
505404	C	1984,1986,1989,2020,0000,
505405	N	1967,1972,1976,1980,1981,1983,1984,1986,1989,2020,

Appendix C: MOBILE4 Block Data 05

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505406	N	0000,0000,0000,0000,0000/
505407	C	
505408		DATA IDLH12/
505409	H	1967,1969,1971,1974,1976,1977,1978,1981,1983,1987,
505410	H	2020,0000,0000,0000,0000,
505411	C	1967,1969,1971,1974,1976,1977,1978,1981,1983,1987,
505412	C	2020,0000,0000,0000,0000,
505413	N	1967,1972,1978,1981,1987,2020,0000,0000,0000,0000,
505414	N	0000,0000,0000,0000,0000/
505415	C	
505416		DATA IDLH13/
505417	H	1969,1973,1978,1981,1983,1987,2020,0000,0000,0000,
505418	H	0000,0000,0000,0000,0000,
505419	C	1969,1973,1978,1981,1983,1987,2020,0000,0000,0000,
505420	C	0000,0000,0000,0000,0000,
505421	N	1969,1973,1978,1981,1987,2020,0000,0000,0000,0000,
505422	N	0000,0000,0000,0000,0000/
505423	C	
505424		DATA IDLH14/
505425	H	1969,1973,1978,1983,1984,2020,0000,0000,0000,0000,
505426	H	0000,0000,0000,0000,0000,
505427	C	1969,1973,1978,1983,1984,2020,0000,0000,0000,0000,
505428	C	0000,0000,0000,0000,0000,
505429	N	1969,1983,1984,2020,0000,0000,0000,0000,0000,0000,
505430	N	0000,0000,0000,0000,0000/
505431	C	
505432		DATA IDLH15/
505433	H	1974,1976,1977,1978,1979,1981,1983,2020,0000,0000,
505434	H	0000,0000,0000,0000,0000,
505435	C	1974,1976,1977,1978,1979,1983,2020,0000,0000,0000,
505436	C	0000,0000,0000,0000,0000,
505437	N	1974,1976,1977,1978,1979,1980,1984,2020,0000,0000,
505438	N	0000,0000,0000,0000,0000/
505439	C	
505440		DATA IDLH16/
505441	H	1978,1983,2020,0000,0000,0000,0000,0000,0000,0000,
505442	H	0000,0000,0000,0000,0000,
505443	C	1978,1979,1983,2020,0000,0000,0000,0000,0000,0000,
505444	C	0000,0000,0000,0000,0000,
505445	N	1978,1979,1984,2020,0000,0000,0000,0000,0000,0000,
505446	N	0000,0000,0000,0000,0000/
505447	C	
505448		DATA IDLH17/
505449	H	1984,2020,0000,0000,0000,0000,0000,0000,0000,0000,
505450	H	0000,0000,0000,0000,0000,
505451	C	2020,0000,0000,0000,0000,0000,0000,0000,0000,0000,
505452	C	0000,0000,0000,0000,0000,
505453	N	1984,2020,0000,0000,0000,0000,0000,0000,0000,0000,
505454	N	0000,0000,0000,0000,0000/
505455	C	
505456		DATA IDLH18/
505457	H	1977,1979,2020,0000,0000,0000,0000,0000,0000,0000,
505458	H	0000,0000,0000,0000,0000,
505459	C	1977,1979,2020,0000,0000,0000,0000,0000,0000,0000,
505460	C	0000,0000,0000,0000,0000,
505461	N	1977,2020,0000,0000,0000,0000,0000,0000,0000,0000,
505462	N	0000,0000,0000,0000,0000/
505463	C	

505464 DATA MAXIDL/15/
 505465 C
 505466 C
 505467 C /IDLEQ3/:
 505468 C
 505469 C
 505470 C Untampered HC & CO idle ef offsets (g/hr) and average NOx idle ef (g/hr)
 505471 C by vehicle class and model year (LBs of MYGs 1 are in IDLREV in BEFIDL +
 505472 C corresponding HDGV offsets and average efs are also in BEFIDL).
 505473 C
 505474 C Note: 1979-1980 is actually 1 MYG for LDGT. The data points are duplicated
 505475 C in order to have 1 to 1 correspondence between LDGV & LDGT MYG UBs.
 505476 C
 505477 DATA UTIDOF/
 505478 C 1979- 1980 1981 1982 1983 1984 1985
 505479 C 1986 1987 1988 1989 1990 1991 1992+
 505480 C LDGV
 505481 H 0.00, 0.00, 0.00, 0.00, 1.56, 1.58, 1.22,
 505482 H 0.41, 0.32, 0.24, 0.20, 0.17, 0.11, 0.05,
 505483 C 38.77, -18.92, -16.88, -14.80, 2.83, 2.04, -11.77,
 505484 C -42.13, -46.97, -51.00, -52.63, -54.27, -57.60, -60.18,
 505485 N 3.98, 7.23, 6.85, 6.41, 2.07, 2.00, 1.93,
 505486 N 1.78, 1.72, 1.66, 1.64, 1.62, 1.57, 1.54,
 505487 C LDGT1/2
 505488 H 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00,
 505489 H 0.73, 0.33, 0.24, 0.23, 0.22, 0.21, 0.16,
 505490 C 67.43, 67.43, -14.15, -15.76, -14.71, -14.25, -14.98,
 505491 C -23.11, -22.21, -50.74, -51.37, -52.06, -52.13, -54.77,
 505492 N 3.98, 3.98, 7.34, 7.31, 7.37, 7.62, 6.96,
 505493 N 2.00, 1.73, 1.66, 1.66, 1.65, 1.65, 1.61/
 505494 C
 505495 C
 505496 END

```

506000      BLOCK DATA BD06
506001      C
506002      C BLOCK DATA Subprogram 06: /IM12HC/ CR12HC
506003      C
506004      C BLOCK DATA 06 initializes the HC Tech 1-2 I/M credits array.
506005      C
506006      C Common block array subscripts:
506007      C
506008      C CR12HC(19,20,5,2) - CR12HC ( BY, AGE1ST, ISTRN, ITECH )
506009      C
506010      C Common block dictionary:
506011      C
506012      C   Name      Type      Description
506013      C   -----
506014      C /IM12HC/:
506015      C
506016      C CR12HC   R      I/M HC credit percentages for technologies 1 and 2
506017      C
506018      C Local array subscripts:
506019      C
506020      C R<I><J><K>(19,10) - R<I><J><K> ( BY, AGE1ST )
506021      C
506022      C where I = 1,2; J = ISTRN; K = ITECH
506023      C
506024      C Local array dictionary:
506025      C
506026      C The local arrays are all technology 1 & 2 I/M HC credit percentages.
506027      C Their names follow the IJK syntax described for the subscripts. Note that:
506028      C
506029      C R<I><J><K>(1,1) EQU to CR12HC(1,1,<J>,<K>), if I=1
506030      C                      CR12HC(1,11,<J>,<K>), if I=2
506031      C
506032      C Notes:
506033      C
506034      C BD 06 was split in MOBILE4 into BD 06 (for HC) and BD 07 (for CO).
506035      C The old BD 07 - BD 32 were each moved up a notch to BD 08 - BD 33.
506036      C CRED12's initialization is split across 2 BD because of the Microsoft FTN77
506037      C compiler's limit on the number of EQUIVALENCE statements in a BD.
506038      C BD 06 was modified in MOBILE4, removing mechanic training credits,
506039      C inserting in their place biennial Tech 1 & 2 credits, and changing the
506040      C credits to account for a new definition of Stringency and for new data.
506041      C
506042      C
506043      C      COMMON /IM12HC/ CR12HC(19,20,5,2)
506044      C
506045      C      DIMENSION
506046      C      *R111(19,10),R211(19,10),R121(19,10),R221(19,10),
506047      C      *R131(19,10),R231(19,10),R141(19,10),R241(19,10),
506048      C      *R151(19,10),R251(19,10),
506049      C      *R112(19,10),R212(19,10),R122(19,10),R222(19,10),
506050      C      *R132(19,10),R232(19,10),R142(19,10),R242(19,10),
506051      C      *R152(19,10),R252(19,10)
506052      C
506053      C      EQUIVALENCE
506054      C      *(CR12HC(1,1,1,1),R111(1,1)),(CR12HC(1,11,1,1),R211(1,1)),
506055      C      *(CR12HC(1,1,2,1),R121(1,1)),(CR12HC(1,11,2,1),R221(1,1)),
506056      C      *(CR12HC(1,1,3,1),R131(1,1)),(CR12HC(1,11,3,1),R231(1,1)),
506057      C      *(CR12HC(1,1,4,1),R141(1,1)),(CR12HC(1,11,4,1),R241(1,1)),

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506058 *(CR12HC(1,1,5,1),R151(1,1)),(CR12HC(1,11,5,1),R251(1,1)).
 506059 *(CR12HC(1,1,1,2),R112(1,1)),(CR12HC(1,11,1,2),R212(1,1)).
 506060 *(CR12HC(1,1,2,2),R122(1,1)),(CR12HC(1,11,2,2),R222(1,1)).
 506061 *(CR12HC(1,1,3,2),R132(1,1)),(CR12HC(1,11,3,2),R232(1,1)).
 506062 *(CR12HC(1,1,4,2),R142(1,1)),(CR12HC(1,11,4,2),R242(1,1)).
 506063 *(CR12HC(1,1,5,2),R152(1,1)),(CR12HC(1,11,5,2),R252(1,1))

C

C Inspection / maintenance reduction percentages for technologies 1 through 2:

C

506064 DATA R111/.028,.061,.057,.053,.053,.054,.055,.056,.056,.056,
 506065 * .056,.062,.068,.076,.083,.092,.100,.108,.116,
 506066 * .064,.054,.054,.053,.055,.054,.056,.056,.056,.056,
 506067 * .062,.068,.076,.083,.092,.100,.108,.116,.048,
 506070 * .065,.049,.051,.055,.055,.055,.056,.056,.056,.062,
 506071 * .068,.076,.083,.092,.100,.108,.116,.060,.049,
 506072 * .066,.050,.052,.053,.056,.056,.056,.056,.062,.068,
 506073 * .076,.083,.092,.100,.108,.116,.054,.060,.045,
 506074 * .068,.052,.054,.053,.054,.057,.056,.061,.068,.076,
 506075 * .083,.092,.100,.108,.116,.053,.049,.053,.045,
 506076 * .070,.051,.053,.053,.053,.055,.061,.067,.076,.083,
 506077 * .092,.100,.108,.116,.054,.048,.048,.052,.041,
 506078 * .072,.050,.053,.053,.055,.060,.066,.074,.083,.092,
 506079 * .100,.108,.116,.054,.048,.046,.042,.046,.041,
 506080 * .073,.052,.053,.055,.059,.065,.073,.082,.092,.100,
 506081 * .108,.116,.054,.048,.046,.042,.042,.045,.038,
 506082 * .074,.052,.053,.058,.065,.073,.082,.092,.100,.108,
 506083 * .116,.054,.049,.046,.041,.041,.037,.040,.036,
 506084 * .075,.052,.057,.063,.072,.081,.092,.100,.108,.116,
 506085 * .054,.049,.046,.042,.042,.036,.036,.037,.036/
 506086 DATA R211/.076,.056,.064,.072,.081,.090,.100,.108,.116,.054,
 506087 * .049,.046,.042,.042,.036,.036,.030,.036,.036,
 506088 * .080,.062,.072,.081,.089,.098,.107,.115,.054,.049,
 506089 * .046,.042,.042,.036,.035,.030,.029,.036,.034,
 506090 * .084,.069,.079,.088,.096,.106,.114,.054,.049,.046,
 506091 * .041,.042,.036,.035,.032,.029,.028,.034,.034,
 506092 * .089,.077,.086,.094,.103,.113,.054,.049,.046,.041,
 506093 * .042,.036,.035,.032,.030,.028,.029,.034,.035,
 506094 * .093,.085,.093,.101,.111,.054,.049,.046,.041,.042,
 506095 * .036,.035,.032,.030,.029,.029,.029,.035,.034,
 506096 * .098,.093,.099,.108,.054,.049,.046,.042,.042,.036,
 506097 * .036,.032,.030,.029,.030,.029,.029,.034,.032,
 506098 * .102,.101,.106,.054,.049,.046,.042,.042,.037,.036,
 506099 * .032,.030,.030,.030,.028,.029,.029,.032,.032,
 506100 * .106,.108,.054,.049,.046,.042,.042,.037,.035,.032,
 506101 * .030,.030,.032,.028,.029,.029,.029,.032,.032,
 506102 * .109,.054,.049,.046,.042,.042,.037,.035,.032,.030,
 506103 * .030,.032,.030,.029,.028,.029,.028,.032,.032,
 506104 * .054,.049,.046,.042,.042,.037,.035,.032,.030,.030,
 506105 * .032,.030,.029,.028,.029,.028,.029,.032,.014/
 506106 DATA R121/.033,.080,.092,.096,.096,.098,.100,.101,.103,.104,
 506107 * .104,.111,.122,.131,.144,.155,.167,.177,.190,
 506108 * .075,.090,.095,.095,.098,.100,.101,.103,.104,.104,
 506109 * .111,.122,.131,.144,.155,.167,.177,.190,.071,
 506110 * .080,.091,.093,.097,.100,.101,.103,.104,.104,.111,
 506111 * .122,.131,.143,.155,.167,.177,.190,.087,.069,
 506112 * .084,.091,.094,.098,.102,.102,.104,.105,.111,.122,
 506113 * .131,.143,.155,.167,.177,.190,.086,.084,.067,
 506114 * .086,.092,.097,.098,.103,.101,.104,.109,.122,.131,
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506116	*	.144,.155,.167,.177,.190,.086,.080,.079,.064,
506117	*	.088,.091,.098,.099,.102,.103,.109,.119,.131,.143,
506118	*	.155,.167,.177,.190,.087,.080,.078,.074,.061,
506119	*	.090,.094,.098,.101,.104,.110,.119,.131,.144,.155,
506120	*	.167,.177,.190,.087,.082,.077,.072,.069,.058,
506121	*	.093,.095,.098,.103,.111,.120,.131,.144,.155,.167,
506122	*	.177,.190,.089,.083,.078,.071,.067,.064,.055,
506123	*	.095,.096,.097,.109,.120,.132,.143,.155,.168,.178,
506124	*	.190,.089,.085,.079,.072,.066,.061,.058,.052,
506125	*	.097,.096,.102,.119,.132,.144,.155,.167,.178,.190,
506126	*	.090,.086,.080,.072,.068,.061,.057,.053,.050/
506127		DATA R221/.099,.100,.111,.129,.143,.155,.166,.177,.190,.090,
506128	*	.086,.080,.075,.068,.062,.057,.051,.050,.049,
506129	*	.104,.105,.121,.137,.153,.166,.178,.191,.090,.087,
506130	*	.081,.075,.069,.062,.057,.051,.049,.049,.050,
506131	*	.111,.115,.129,.146,.159,.177,.190,.090,.087,.081,
506132	*	.075,.069,.063,.057,.053,.049,.049,.050,.047,
506133	*	.117,.126,.140,.157,.172,.188,.091,.087,.081,.075,
506134	*	.069,.063,.058,.053,.050,.049,.049,.047,.049,
506135	*	.123,.134,.151,.168,.182,.091,.087,.081,.075,.069,
506136	*	.064,.058,.053,.050,.049,.049,.049,.049,.047,
506137	*	.129,.142,.160,.173,.091,.087,.081,.075,.070,.064,
506138	*	.058,.053,.050,.049,.050,.049,.049,.047,.047,
506139	*	.134,.153,.171,.091,.087,.081,.076,.070,.064,.058,
506140	*	.053,.050,.050,.050,.049,.049,.047,.047,.046,
506141	*	.140,.162,.091,.087,.082,.076,.070,.064,.058,.053,
506142	*	.050,.050,.050,.049,.050,.047,.048,.046,.047,
506143	*	.145,.091,.087,.082,.076,.070,.064,.058,.054,.050,
506144	*	.050,.050,.049,.050,.048,.048,.047,.047,.043,
506145	*	.091,.087,.082,.076,.070,.064,.058,.054,.050,.050,
506146	*	.050,.049,.049,.048,.049,.047,.049,.043,.016/
506147		DATA R131/.037,.095,.111,.113,.115,.117,.120,.123,.125,.127,
506148	*	.129,.137,.148,.162,.177,.190,.203,.217,.231,
506149	*	.083,.112,.113,.115,.117,.120,.122,.125,.127,.129,
506150	*	.137,.148,.162,.177,.190,.203,.217,.230,.082,
506151	*	.088,.113,.116,.117,.119,.122,.125,.127,.129,.137,
506152	*	.148,.162,.177,.190,.203,.216,.230,.102,.080,
506153	*	.094,.114,.118,.121,.122,.125,.126,.129,.136,.148,
506154	*	.162,.176,.190,.203,.216,.230,.105,.098,.078,
506155	*	.099,.116,.121,.123,.123,.126,.129,.136,.148,.161,
506156	*	.176,.190,.203,.216,.230,.105,.101,.093,.075,
506157	*	.103,.117,.122,.125,.126,.129,.137,.148,.161,.176,
506158	*	.190,.203,.216,.230,.107,.101,.094,.087,.072,
506159	*	.106,.118,.124,.126,.128,.137,.148,.162,.176,.190,
506160	*	.203,.216,.230,.107,.102,.094,.089,.080,.068,
506161	*	.108,.120,.127,.128,.136,.149,.161,.176,.190,.203,
506162	*	.216,.230,.108,.102,.095,.089,.082,.075,.065,
506163	*	.111,.121,.130,.137,.149,.162,.176,.190,.203,.216,
506164	*	.230,.108,.103,.095,.090,.082,.075,.069,.061,
506165	*	.113,.124,.139,.150,.163,.176,.190,.203,.216,.230,
506166	*	.109,.103,.096,.090,.084,.076,.070,.062,.060/
506167		DATA R231/.116,.131,.150,.163,.176,.191,.203,.216,.230,.109,
506168	*	.103,.096,.090,.084,.077,.070,.063,.060,.057,
506169	*	.123,.142,.161,.177,.189,.203,.217,.230,.109,.103,
506170	*	.096,.091,.084,.077,.071,.063,.060,.057,.058,
506171	*	.131,.155,.172,.189,.203,.215,.230,.109,.104,.096,
506172	*	.091,.084,.078,.071,.065,.060,.059,.058,.056,
506173	*	.139,.166,.185,.202,.217,.229,.109,.104,.096,.091,

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506174	*	.084,.078,.071,.065,.061,.059,.059,.056,.058,
506175	*	.146,.175,.198,.217,.230,.109,.104,.096,.091,.084,
506176	*	.079,.071,.065,.061,.060,.059,.058,.058,.056,
506177	*	.152,.187,.212,.229,.109,.104,.097,.091,.085,.079,
506178	*	.072,.065,.062,.060,.060,.058,.060,.056,.058,
506179	*	.158,.197,.224,.109,.104,.097,.091,.085,.079,.072,
506180	*	.065,.062,.061,.060,.058,.060,.058,.058,.054,
506181	*	.165,.210,.109,.104,.097,.091,.085,.079,.072,.065,
506182	*	.062,.061,.060,.058,.060,.058,.060,.054,.056,
506183	*	.171,.109,.104,.097,.091,.085,.079,.072,.065,.062,
506184	*	.061,.060,.058,.060,.058,.060,.058,.056,.052,
506185	*	.109,.104,.097,.091,.085,.079,.072,.065,.062,.061,
506186	*	.060,.058,.060,.058,.060,.058,.060,.052,.019/
506187		DATA R141/.043,.108,.122,.121,.122,.124,.126,.129,.132,.135,
506188	*	.138,.148,.163,.177,.191,.207,.222,.237,.251,
506189	*	.096,.125,.122,.122,.124,.126,.129,.132,.135,.138,
506190	*	.148,.162,.176,.191,.207,.222,.237,.251,.087,
506191	*	.102,.126,.125,.124,.126,.128,.132,.135,.138,.148,
506192	*	.162,.176,.191,.207,.222,.237,.251,.109,.087,
506193	*	.108,.126,.127,.127,.128,.131,.134,.138,.148,.162,
506194	*	.176,.191,.207,.222,.237,.251,.111,.106,.083,
506195	*	.113,.127,.130,.130,.132,.134,.137,.148,.162,.176,
506196	*	.191,.206,.222,.236,.251,.111,.109,.098,.082,
506197	*	.116,.129,.133,.133,.134,.137,.147,.162,.176,.191,
506198	*	.206,.221,.236,.251,.114,.109,.101,.095,.077,
506199	*	.120,.132,.136,.136,.138,.147,.162,.176,.191,.206,
506200	*	.221,.236,.251,.114,.109,.101,.095,.087,.075,
506201	*	.123,.135,.140,.140,.148,.162,.176,.190,.206,.221,
506202	*	.236,.251,.115,.110,.101,.095,.088,.082,.071,
506203	*	.126,.138,.144,.150,.162,.176,.190,.206,.221,.236,
506204	*	.251,.115,.111,.101,.095,.088,.082,.075,.068,
506205	*	.128,.141,.154,.165,.177,.191,.206,.221,.236,.251,
506206	*	.116,.111,.102,.096,.089,.081,.075,.068,.065/
506207		DATA R241/.130,.149,.168,.179,.192,.206,.221,.236,.250,.116,
506208	*	.111,.102,.096,.089,.082,.075,.068,.065,.064,
506209	*	.137,.163,.182,.194,.207,.221,.236,.250,.116,.111,
506210	*	.102,.096,.089,.082,.076,.068,.064,.064,.066,
506211	*	.146,.175,.197,.210,.223,.236,.250,.116,.111,.102,
506212	*	.096,.089,.082,.076,.067,.064,.064,.066,.064,
506213	*	.154,.188,.212,.225,.238,.251,.116,.111,.102,.096,
506214	*	.089,.082,.076,.067,.064,.064,.064,.064,.065,
506215	*	.161,.201,.227,.240,.253,.116,.111,.102,.096,.089,
506216	*	.082,.076,.068,.064,.063,.064,.063,.065,.063,
506217	*	.169,.214,.241,.256,.116,.111,.103,.096,.089,.082,
506218	*	.076,.068,.064,.063,.064,.063,.065,.063,.065,
506219	*	.176,.224,.255,.116,.112,.103,.097,.089,.083,.076,
506220	*	.068,.064,.063,.064,.063,.065,.064,.065,.061,
506221	*	.183,.237,.116,.112,.103,.097,.090,.083,.076,.068,
506222	*	.065,.063,.065,.063,.065,.064,.067,.061,.065,
506223	*	.190,.116,.112,.103,.097,.090,.083,.076,.068,.065,
506224	*	.064,.065,.064,.065,.065,.067,.065,.065,.060,
506225	*	.116,.112,.103,.097,.090,.083,.076,.068,.065,.064,
506226	*	.065,.064,.065,.065,.067,.065,.068,.060,.022/
506227		DATA R151/.050,.121,.130,.125,.125,.125,.125,.127,.130,.134,
506228	*	.138,.149,.163,.179,.193,.208,.223,.238,.253,
506229	*	.111,.133,.126,.125,.125,.125,.127,.130,.134,.138,
506230	*	.149,.163,.178,.193,.208,.223,.238,.253,.092,
506231	*	.113,.132,.127,.125,.125,.126,.130,.134,.138,.149,

506232	*	.163,.178,.193,.208,.223,.238,.253,.115,.093,
506233	*	.118,.132,.128,.126,.126,.129,.133,.138,.148,.163,
506234	*	.178,.192,.207,.223,.238,.253,.117,.112,.088,
506235	*	.122,.134,.131,.127,.128,.132,.137,.148,.163,.178,
506236	*	.192,.207,.223,.238,.253,.116,.111,.104,.086,
506237	*	.126,.136,.135,.130,.131,.137,.148,.163,.178,.192,
506238	*	.207,.223,.237,.253,.116,.111,.103,.101,.082,
506239	*	.129,.137,.140,.135,.136,.147,.162,.177,.192,.207,
506240	*	.222,.237,.253,.115,.111,.103,.097,.093,.079,
506241	*	.131,.139,.144,.141,.147,.161,.177,.192,.207,.222,
506242	*	.237,.253,.116,.111,.103,.097,.092,.087,.076,
506243	*	.134,.142,.150,.152,.162,.176,.192,.206,.222,.237,
506244	*	.252,.116,.111,.103,.097,.092,.084,.080,.072,
506245	*	.136,.146,.161,.168,.178,.191,.206,.222,.237,.252,
506246	*	.116,.111,.103,.097,.091,.084,.078,.073,.069/
506247		DATA R251/.138,.157,.176,.183,.193,.207,.221,.237,.252,.116,
506248	*	.111,.103,.097,.091,.084,.078,.071,.069,.068,
506249	*	.145,.171,.193,.199,.208,.222,.237,.252,.116,.111,
506250	*	.104,.097,.092,.084,.079,.071,.067,.068,.070,
506251	*	.154,.186,.209,.215,.224,.237,.252,.116,.111,.104,
506252	*	.097,.092,.085,.079,.070,.067,.066,.070,.068,
506253	*	.162,.201,.224,.231,.239,.252,.116,.111,.104,.097,
506254	*	.092,.085,.079,.070,.067,.066,.068,.068,.071,
506255	*	.170,.214,.240,.247,.255,.116,.111,.104,.097,.093,
506256	*	.085,.079,.070,.067,.066,.068,.067,.071,.068,
506257	*	.177,.227,.255,.262,.117,.111,.104,.098,.093,.085,
506258	*	.079,.070,.068,.066,.068,.067,.069,.068,.071,
506259	*	.185,.240,.270,.117,.112,.104,.098,.093,.085,.079,
506260	*	.071,.068,.067,.068,.066,.069,.067,.071,.067,
506261	*	.191,.253,.117,.112,.104,.098,.093,.085,.079,.071,
506262	*	.068,.067,.068,.066,.069,.067,.071,.067,.071,
506263	*	.198,.117,.112,.104,.098,.093,.086,.079,.071,.068,
506264	*	.067,.068,.067,.069,.068,.071,.068,.071,.067,
506265	*	.117,.112,.104,.098,.093,.086,.079,.071,.068,.067,
506266	*	.068,.067,.069,.068,.071,.068,.072,.067,.025/
506267		DATA R112/.024,.076,.104,.123,.138,.154,.170,.183,.197,.211,
506268	*	.223,.237,.250,.264,.275,.288,.301,.314,.327,
506269	*	.066,.100,.122,.137,.153,.170,.182,.196,.210,.222,
506270	*	.236,.249,.264,.275,.288,.300,.313,.327,.056,
506271	*	.071,.110,.132,.149,.167,.182,.195,.207,.219,.232,
506272	*	.246,.260,.274,.286,.299,.310,.323,.096,.052,
506273	*	.077,.119,.142,.162,.180,.193,.207,.218,.231,.244,
506274	*	.258,.272,.284,.296,.310,.322,.125,.094,.054,
506275	*	.080,.124,.150,.173,.191,.204,.218,.230,.243,.256,
506276	*	.270,.282,.294,.306,.318,.148,.123,.093,.052,
506277	*	.086,.132,.161,.184,.200,.215,.228,.241,.254,.268,
506278	*	.282,.294,.305,.317,.160,.144,.120,.090,.054,
506279	*	.088,.135,.170,.193,.210,.225,.238,.252,.265,.280,
506280	*	.291,.304,.315,.169,.155,.139,.117,.089,.050,
506281	*	.090,.141,.178,.200,.219,.233,.248,.262,.276,.292,
506282	*	.303,.315,.176,.164,.150,.134,.112,.086,.050,
506283	*	.092,.147,.186,.210,.229,.244,.259,.274,.288,.300,
506284	*	.312,.179,.169,.158,.144,.128,.109,.083,.049,
506285	*	.093,.153,.194,.219,.237,.253,.269,.284,.297,.309,
506286	*	.179,.171,.161,.151,.138,.123,.104,.080,.049/
506287		DATA R212/.095,.158,.201,.228,.246,.264,.280,.296,.308,.181,
506288	*	.172,.162,.153,.144,.132,.117,.100,.078,.047,
506289	*	.096,.163,.207,.236,.256,.274,.290,.306,.183,.174,

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506290	*	.164,.155,.146,.137,.125,.112,.096,.076,.048,
506291	*	.097,.167,.213,.243,.264,.283,.301,.183,.174,.166,
506292	*	.156,.147,.139,.130,.118,.105,.091,.075,.046,
506293	*	.098,.170,.217,.249,.273,.292,.183,.174,.165,.157,
506294	*	.148,.139,.130,.121,.110,.097,.086,.072,.047,
506295	*	.099,.173,.219,.253,.278,.183,.174,.165,.157,.148,
506296	*	.139,.132,.123,.114,.104,.092,.082,.069,.044,
506297	*	.100,.177,.225,.259,.185,.175,.166,.157,.149,.141,
506298	*	.132,.124,.116,.106,.096,.087,.078,.065,.043,
506299	*	.101,.179,.230,.185,.176,.167,.159,.150,.140,.132,
506300	*	.124,.117,.108,.097,.089,.080,.071,.060,.040,
506301	*	.101,.182,.187,.177,.168,.160,.151,.141,.132,.124,
506302	*	.117,.108,.099,.089,.080,.073,.066,.055,.037,
506303	*	.102,.188,.178,.169,.160,.151,.142,.134,.125,.119,
506304	*	.110,.100,.090,.081,.074,.068,.058,.049,.034,
506305	*	.189,.178,.169,.160,.151,.142,.134,.125,.119,.110,
506306	*	.100,.090,.082,.075,.068,.059,.050,.038,.012/
506307		DATA R122/.037,.116,.152,.176,.201,.220,.240,.261,.278,.296,
506308	*	.312,.328,.342,.356,.369,.382,.397,.413,.427,
506309	*	.107,.149,.174,.201,.219,.240,.261,.277,.296,.312,
506310	*	.328,.341,.357,.370,.383,.397,.412,.426,.091,
506311	*	.119,.165,.194,.219,.237,.258,.277,.294,.310,.325,
506312	*	.341,.354,.369,.383,.397,.411,.423,.160,.089,
506313	*	.125,.179,.210,.234,.254,.274,.291,.307,.323,.338,
506314	*	.352,.366,.378,.391,.404,.418,.199,.157,.089,
506315	*	.132,.191,.224,.249,.269,.286,.303,.319,.334,.349,
506316	*	.363,.377,.390,.403,.415,.229,.195,.155,.087,
506317	*	.140,.203,.238,.264,.283,.302,.318,.333,.348,.361,
506318	*	.375,.388,.400,.413,.243,.222,.190,.153,.089,
506319	*	.145,.213,.252,.278,.297,.315,.331,.346,.359,.373,
506320	*	.385,.397,.410,.255,.236,.215,.186,.152,.087,
506321	*	.149,.221,.264,.289,.309,.327,.342,.357,.370,.384,
506322	*	.396,.408,.261,.245,.227,.206,.178,.146,.085,
506323	*	.152,.228,.272,.299,.321,.339,.354,.368,.382,.394,
506324	*	.406,.265,.251,.236,.218,.199,.173,.140,.082,
506325	*	.155,.236,.283,.311,.332,.349,.365,.378,.393,.405,
506326	*	.267,.255,.241,.228,.211,.192,.167,.134,.081/
506327		DATA R222/.157,.243,.292,.322,.343,.361,.375,.389,.402,.269,
506328	*	.257,.243,.230,.218,.201,.183,.159,.131,.079,
506329	*	.161,.253,.301,.333,.355,.372,.386,.400,.271,.259,
506330	*	.247,.233,.220,.207,.191,.173,.152,.125,.076,
506331	*	.168,.258,.310,.341,.364,.382,.398,.272,.261,.248,
506332	*	.236,.222,.211,.196,.181,.164,.145,.120,.075,
506333	*	.170,.262,.316,.350,.375,.392,.274,.261,.249,.237,
506334	*	.225,.213,.200,.185,.172,.157,.139,.115,.073,
506335	*	.172,.270,.325,.360,.385,.276,.262,.251,.238,.227,
506336	*	.214,.203,.190,.176,.162,.148,.130,.110,.071,
506337	*	.174,.275,.333,.369,.276,.264,.252,.240,.228,.215,
506338	*	.204,.190,.176,.163,.150,.137,.122,.102,.066,
506339	*	.176,.280,.340,.277,.266,.253,.241,.229,.216,.204,
506340	*	.192,.178,.166,.153,.140,.126,.111,.094,.062,
506341	*	.177,.284,.280,.267,.256,.243,.231,.217,.206,.193,
506342	*	.181,.167,.155,.142,.129,.116,.102,.086,.058,
506343	*	.178,.281,.269,.257,.244,.233,.220,.206,.194,.181,
506344	*	.169,.155,.142,.130,.117,.104,.090,.078,.053,
506345	*	.283,.270,.257,.244,.233,.220,.207,.195,.182,.169,
506346	*	.156,.142,.130,.117,.104,.090,.078,.061,.019/
506347		DATA R132/.049,.150,.191,.220,.247,.269,.288,.306,.324,.341,

506348	*	.358,.373,.387,.400,.414,.427,.439,.451,.463,
506349	*	.138,.187,.218,.246,.269,.287,.306,.323,.340,.357,
506350	*	.372,.386,.399,.413,.426,.439,.450,.462,.124,
506351	*	.153,.206,.240,.265,.286,.303,.321,.337,.353,.369,
506352	*	.383,.397,.411,.423,.435,.447,.459,.218,.120,
506353	*	.166,.226,.258,.283,.301,.319,.336,.352,.367,.381,
506354	*	.395,.408,.421,.433,.444,.456,.260,.214,.123,
506355	*	.176,.243,.276,.298,.317,.334,.350,.365,.380,.393,
506356	*	.406,.419,.432,.443,.454,.291,.255,.212,.118,
506357	*	.185,.256,.290,.313,.332,.348,.363,.378,.391,.404,
506358	*	.417,.430,.442,.453,.303,.282,.248,.206,.119,
506359	*	.192,.268,.304,.328,.345,.361,.376,.389,.402,.415,
506360	*	.427,.439,.450,.313,.294,.274,.241,.201,.115,
506361	*	.198,.278,.317,.340,.358,.373,.387,.400,.413,.425,
506362	*	.437,.448,.317,.302,.284,.264,.233,.195,.114,
506363	*	.203,.289,.329,.353,.371,.385,.398,.411,.423,.435,
506364	*	.446,.320,.306,.292,.275,.255,.227,.190,.112,
506365	*	.210,.299,.341,.365,.382,.396,.409,.422,.434,.445,
506366	*	.322,.309,.296,.281,.264,.247,.219,.183,.109/
506367		DATA R232/.218,.310,.352,.377,.394,.408,.420,.433,.445,.324,
506368	*	.311,.298,.284,.270,.254,.236,.208,.176,.105,
506369	*	.221,.316,.361,.387,.405,.418,.430,.442,.326,.313,
506370	*	.299,.286,.272,.258,.242,.224,.199,.169,.104,
506371	*	.225,.323,.370,.397,.414,.428,.440,.326,.314,.301,
506372	*	.288,.274,.261,.246,.230,.213,.190,.162,.100,
506373	*	.228,.331,.379,.406,.424,.437,.329,.316,.303,.290,
506374	*	.276,.262,.249,.234,.218,.201,.180,.154,.098,
506375	*	.231,.338,.388,.415,.433,.330,.317,.304,.292,.278,
506376	*	.264,.250,.236,.221,.207,.190,.170,.147,.094,
506377	*	.234,.344,.395,.423,.332,.319,.306,.293,.279,.265,
506378	*	.252,.238,.225,.209,.193,.177,.159,.137,.088,
506379	*	.237,.350,.402,.333,.321,.308,.294,.280,.267,.253,
506380	*	.239,.226,.211,.195,.179,.164,.146,.125,.083,
506381	*	.239,.353,.336,.322,.308,.295,.282,.269,.255,.241,
506382	*	.228,.213,.198,.182,.167,.150,.134,.114,.076,
506383	*	.241,.337,.324,.311,.298,.284,.271,.257,.243,.229,
506384	*	.214,.199,.184,.168,.152,.137,.120,.102,.069,
506385	*	.338,.324,.312,.299,.285,.271,.257,.243,.229,.214,
506386	*	.199,.184,.168,.152,.137,.121,.104,.079,.024/
506387		DATA R142/.054,.165,.210,.237,.259,.279,.299,.316,.334,.350,
506388	*	.365,.379,.392,.405,.417,.428,.438,.448,.457,
506389	*	.153,.207,.235,.258,.279,.298,.315,.333,.349,.365,
506390	*	.378,.392,.404,.416,.428,.437,.447,.456,.148,
506391	*	.170,.226,.255,.277,.297,.314,.332,.348,.363,.377,
506392	*	.390,.403,.415,.426,.436,.445,.455,.262,.145,
506393	*	.188,.244,.272,.294,.312,.331,.346,.362,.375,.389,
506394	*	.402,.413,.425,.435,.444,.454,.299,.256,.145,
506395	*	.201,.260,.289,.310,.328,.345,.360,.374,.387,.400,
506396	*	.412,.423,.433,.443,.452,.326,.292,.251,.141,
506397	*	.213,.275,.305,.326,.343,.359,.372,.385,.398,.410,
506398	*	.422,.432,.442,.451,.336,.317,.284,.245,.140,
506399	*	.224,.289,.320,.340,.357,.372,.383,.396,.409,.420,
506400	*	.431,.440,.450,.343,.326,.307,.276,.239,.138,
506401	*	.235,.303,.334,.353,.370,.383,.395,.406,.419,.429,
506402	*	.439,.448,.345,.331,.314,.297,.266,.232,.135,
506403	*	.243,.315,.346,.366,.381,.393,.405,.417,.428,.437,
506404	*	.447,.346,.333,.319,.303,.285,.257,.225,.132,
506405	*	.250,.327,.358,.378,.391,.404,.416,.426,.437,.446,

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506406	*	.347,.335,.321,.307,.291,.273,.248,.215,.127/
506407	DATA R242/	.256,.337,.370,.388,.402,.414,.425,.435,.445,.349,
506408	*	.336,.323,.309,.294,.278,.262,.237,.206,.124,
506409	*	.262,.346,.380,.399,.413,.424,.434,.444,.350,.337,
506410	*	.324,.310,.296,.282,.267,.251,.227,.198,.121,
506411	*	.269,.356,.391,.410,.423,.434,.443,.351,.338,.326,
506412	*	.312,.299,.285,.269,.255,.238,.215,.189,.117,
506413	*	.274,.365,.399,.419,.432,.442,.352,.340,.326,.313,
506414	*	.301,.286,.271,.257,.241,.225,.204,.178,.111,
506415	*	.278,.373,.409,.428,.440,.354,.340,.328,.315,.301,
506416	*	.287,.273,.258,.243,.227,.211,.190,.166,.106,
506417	*	.282,.380,.416,.435,.354,.342,.329,.315,.301,.288,
506418	*	.273,.259,.244,.229,.214,.196,.177,.155,.101,
506419	*	.286,.387,.425,.355,.343,.330,.317,.303,.289,.275,
506420	*	.261,.245,.231,.215,.198,.181,.162,.142,.094,
506421	*	.290,.395,.357,.345,.331,.318,.304,.289,.276,.262,
506422	*	.247,.232,.216,.199,.183,.166,.148,.130,.087,
506423	*	.295,.358,.346,.333,.319,.306,.291,.276,.262,.248,
506424	*	.233,.217,.201,.184,.167,.150,.134,.116,.078,
506425	*	.359,.346,.333,.319,.306,.292,.277,.262,.248,.233,
506426	*	.217,.201,.185,.167,.152,.135,.117,.089,.027/
506427	DATA R152/	.058,.177,.219,.244,.266,.287,.306,.323,.338,.353,
506428	*	.367,.379,.390,.400,.411,.420,.427,.435,.445,
506429	*	.167,.217,.244,.265,.287,.306,.323,.338,.353,.367,
506430	*	.379,.390,.400,.411,.420,.427,.435,.445,.165,
506431	*	.188,.237,.263,.285,.306,.322,.338,.353,.367,.378,
506432	*	.390,.399,.411,.421,.427,.435,.444,.290,.161,
506433	*	.205,.256,.283,.305,.322,.337,.352,.366,.378,.390,
506434	*	.399,.408,.418,.427,.434,.444,.322,.285,.161,
506435	*	.221,.275,.302,.321,.337,.351,.366,.378,.389,.399,
506436	*	.408,.419,.427,.434,.443,.346,.315,.280,.159,
506437	*	.235,.292,.318,.335,.350,.364,.377,.389,.399,.408,
506438	*	.417,.427,.434,.442,.352,.336,.307,.273,.156,
506439	*	.247,.307,.332,.348,.363,.376,.388,.398,.406,.417,
506440	*	.427,.433,.441,.356,.342,.326,.299,.265,.152,
506441	*	.255,.320,.345,.361,.375,.386,.397,.406,.415,.425,
506442	*	.433,.440,.358,.346,.331,.316,.289,.256,.149,
506443	*	.264,.332,.357,.374,.385,.397,.406,.415,.425,.433,
506444	*	.440,.359,.347,.336,.321,.304,.278,.248,.146,
506445	*	.273,.344,.369,.385,.396,.406,.414,.424,.433,.439,
506446	*	.359,.349,.336,.325,.309,.293,.268,.238,.141/
506447	DATA R252/	.283,.354,.381,.395,.405,.413,.423,.433,.439,.360,
506448	*	.349,.337,.326,.313,.296,.281,.257,.228,.137,
506449	*	.290,.364,.391,.405,.413,.421,.430,.439,.360,.350,
506450	*	.338,.326,.313,.299,.284,.269,.245,.217,.132,
506451	*	.296,.373,.400,.412,.421,.430,.439,.361,.350,.339,
506452	*	.326,.315,.301,.286,.271,.255,.232,.206,.127,
506453	*	.302,.381,.408,.419,.430,.439,.362,.351,.340,.327,
506454	*	.315,.302,.287,.273,.258,.241,.220,.196,.123,
506455	*	.309,.390,.416,.427,.437,.362,.352,.340,.327,.315,
506456	*	.302,.287,.273,.259,.243,.227,.206,.184,.117,
506457	*	.315,.399,.424,.436,.363,.352,.340,.328,.315,.303,
506458	*	.289,.273,.260,.245,.229,.211,.192,.171,.110,
506459	*	.319,.406,.430,.363,.352,.341,.329,.317,.303,.289,
506460	*	.275,.260,.245,.230,.213,.196,.178,.156,.103,
506461	*	.320,.411,.364,.353,.341,.329,.317,.304,.289,.275,
506462	*	.261,.246,.230,.213,.197,.180,.162,.141,.095,
506463	*	.325,.364,.353,.342,.329,.317,.305,.291,.276,.261,

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506464	*	.247,.230,.214,.197,.181,.163,.145,.125,.083,
506465	*	.364,.354,.342,.329,.317,.305,.291,.276,.262,.247,
506466	*	.231,.214,.197,.181,.163,.145,.126,.096,.029/
506467	C	
506468	END	


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507000      BLOCK DATA BD07
507001      C
507002      C BLOCK DATA Subprogram 07: /IM12C0/ CR12C0
507003      C
507004      C BLOCK DATA 07 initializes the C0 Tech 1-2 I/M credits array.
507005      C
507006      C Common block array subscripts:
507007      C
507008      C CR12C0(19,20,5,2) - CR12C0 ( BY, AGE1ST, ISTRN, ITECH )
507009      C
507010      C Common block dictionary:
507011      C
507012      C   Name      Type      Description
507013      C -----
507014      C /IM12C0/:
507015      C
507016      C CR12C0   R      I/M C0 credit percentages for technologies 1 and 2
507017      C
507018      C Local array subscripts:
507019      C
507020      C R<I><J><K>(19,10) - R<I><J><K> ( BY, AGE1ST )
507021      C
507022      C where I = 1,2; J = ISTRN; K = ITECH
507023      C
507024      C Local array dictionary:
507025      C
507026      C The local arrays are all technology 1 & 2 I/M C0 credit percentages.
507027      C Their names follow the IJK syntax described for the subscripts. Note that:
507028      C
507029      C R<I><J><K>(1,1) EQU to CR12C0(1,1,<J>,<K>), if I=1
507030      C                      CR12C0(1,11,<J>,<K>), if I=2
507031      C
507032      C Notes:
507033      C
507034      C BD 07 was added for MOBILE4. The old BD 07 became BD 08, 08 to 09, etc.
507035      C BD 07 was modified in MOBILE4, removing mechanic training credits,
507036      C inserting in their place biennial Tech 1 & 2 credits, and changing the
507037      C credits to account for a new definition of Stringency and for new data.
507038      C
507039      C
507040      COMMON /IM12C0/ CR12C0(19,20,5,2)
507041      C
507042      DIMENSION
507043      *R111(19,10),R211(19,10),R121(19,10),R221(19,10),
507044      *R131(19,10),R231(19,10),R141(19,10),R241(19,10),
507045      *R151(19,10),R251(19,10),
507046      *R112(19,10),R212(19,10),R122(19,10),R222(19,10),
507047      *R132(19,10),R232(19,10),R142(19,10),R242(19,10),
507048      *R152(19,10),R252(19,10)
507049      C
507050      EQUIVALENCE
507051      *(CR12C0(1,1,1,1),R111(1,1)),(CR12C0(1,11,1,1),R211(1,1)),
507052      *(CR12C0(1,1,2,1),R121(1,1)),(CR12C0(1,11,2,1),R221(1,1)),
507053      *(CR12C0(1,1,3,1),R131(1,1)),(CR12C0(1,11,3,1),R231(1,1)),
507054      *(CR12C0(1,1,4,1),R141(1,1)),(CR12C0(1,11,4,1),R241(1,1)),
507055      *(CR12C0(1,1,5,1),R151(1,1)),(CR12C0(1,11,5,1),R251(1,1)),
507056      *(CR12C0(1,1,1,2),R112(1,1)),(CR12C0(1,11,1,2),R212(1,1)),
507057      *(CR12C0(1,1,2,2),R122(1,1)),(CR12C0(1,11,2,2),R222(1,1)),

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507058      *(CR12CO(1,1,3,2),R132(1,1)),(CR12CO(1,11,3,2),R232(1,1)),
507059      *(CR12CO(1,1,4,2),R142(1,1)),(CR12CO(1,11,4,2),R242(1,1)),
507060      *(CR12CO(1,1,5,2),R152(1,1)),(CR12CO(1,11,5,2),R252(1,1))
507061      C
507062      C Inspection / maintenance reduction percentages for technologies 1 through 2:
507063      C
507064      DATA R111/.013,.069,.142,.186,.214,.238,.256,.274,.288,.303,
507065      *      .315,.329,.343,.357,.371,.386,.400,.414,.427,
507066      *      .045,.128,.179,.211,.236,.255,.273,.287,.303,.315,
507067      *      .329,.343,.357,.371,.386,.400,.414,.427,.078,
507068      *      .046,.130,.184,.222,.248,.269,.285,.302,.314,.328,
507069      *      .343,.357,.371,.386,.400,.414,.427,.122,.050,
507070      *      .044,.134,.191,.229,.259,.280,.298,.312,.327,.342,
507071      *      .356,.371,.386,.400,.414,.426,.172,.114,.076,
507072      *      .047,.142,.204,.241,.267,.291,.308,.324,.340,.355,
507073      *      .370,.385,.400,.414,.426,.215,.164,.117,.049,
507074      *      .050,.143,.206,.249,.275,.298,.318,.335,.352,.368,
507075      *      .384,.399,.413,.426,.240,.204,.163,.109,.073,
507076      *      .052,.145,.209,.251,.283,.310,.330,.349,.366,.382,
507077      *      .398,.412,.425,.262,.229,.203,.155,.112,.047,
507078      *      .055,.153,.218,.263,.295,.321,.342,.361,.379,.396,
507079      *      .411,.424,.277,.250,.228,.196,.160,.106,.075,
507080      *      .057,.155,.221,.268,.303,.331,.354,.374,.392,.408,
507081      *      .423,.289,.265,.248,.220,.198,.154,.112,.046,
507082      *      .058,.159,.228,.278,.314,.343,.368,.388,.405,.420,
507083      *      .296,.276,.261,.240,.222,.192,.160,.106,.078/
507084      DATA R211/.060,.165,.238,.289,.327,.357,.380,.400,.417,.301,
507085      *      .282,.271,.252,.239,.213,.194,.149,.114,.047,
507086      *      .061,.166,.244,.298,.338,.368,.392,.412,.304,.285,
507087      *      .274,.257,.247,.225,.208,.176,.148,.100,.070,
507088      *      .062,.169,.250,.306,.346,.377,.402,.307,.289,.279,
507089      *      .262,.255,.235,.225,.197,.177,.138,.102,.043,
507090      *      .063,.172,.254,.312,.354,.385,.308,.290,.281,.266,
507091      *      .259,.241,.232,.211,.194,.167,.142,.097,.075,
507092      *      .064,.176,.259,.317,.360,.308,.292,.283,.268,.262,
507093      *      .245,.238,.219,.208,.185,.170,.135,.106,.044,
507094      *      .066,.180,.263,.323,.308,.293,.284,.269,.263,.247,
507095      *      .241,.221,.212,.192,.181,.155,.133,.088,.065,
507096      *      .067,.184,.268,.309,.293,.284,.270,.264,.248,.243,
507097      *      .225,.218,.200,.189,.167,.156,.121,.092,.039,
507098      *      .068,.187,.309,.293,.285,.270,.265,.250,.244,.227,
507099      *      .220,.206,.197,.174,.165,.141,.121,.081,.068,
507100      *      .069,.309,.293,.285,.271,.266,.250,.245,.228,.222,
507101      *      .208,.204,.181,.174,.153,.144,.116,.093,.047,
507102      *      .309,.294,.285,.271,.266,.250,.245,.228,.222,.209,
507103      *      .204,.183,.176,.155,.147,.123,.104,.052,.007/
507104      DATA R121/.025,.113,.206,.261,.295,.321,.343,.360,.377,.394,
507105      *      .409,.422,.438,.451,.465,.478,.491,.502,.514,
507106      *      .084,.192,.255,.292,.319,.342,.360,.377,.394,.409,
507107      *      .422,.438,.451,.465,.478,.491,.502,.514,.131,
507108      *      .089,.204,.270,.309,.336,.357,.377,.394,.409,.422,
507109      *      .438,.451,.465,.478,.491,.502,.514,.205,.086,
507110      *      .093,.216,.284,.326,.354,.375,.393,.408,.422,.438,
507111      *      .451,.465,.478,.491,.502,.514,.273,.198,.132,
507112      *      .095,.227,.298,.339,.368,.386,.404,.419,.436,.450,
507113      *      .464,.477,.491,.502,.514,.334,.269,.205,.086,
507114      *      .096,.230,.308,.350,.379,.399,.416,.431,.447,.463,
507115      *      .476,.490,.501,.514,.361,.322,.266,.191,.127,

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507116	*	.099,.240,.319,.363,.393,.414,.430,.447,.463,.476,
507117	*	.490,.501,.514,.388,.353,.322,.258,.196,.083,
507118	*	.102,.248,.329,.376,.407,.428,.445,.462,.476,.490,
507119	*	.501,.514,.398,.373,.345,.304,.252,.181,.122,
507120	*	.105,.254,.333,.383,.414,.438,.457,.473,.489,.501,
507121	*	.513,.409,.385,.368,.332,.303,.244,.186,.080,
507122	*	.107,.259,.341,.392,.427,.452,.470,.487,.500,.513,
507123	*	.413,.393,.377,.351,.326,.289,.243,.175,.121/
507124		DATA R221/.110,.262,.348,.402,.437,.463,.481,.496,.511,.418,
507125	*	.398,.386,.361,.346,.313,.290,.234,.181,.079,
507126	*	.112,.262,.355,.411,.449,.474,.493,.509,.419,.400,
507127	*	.389,.367,.353,.328,.308,.273,.232,.167,.119,
507128	*	.114,.267,.360,.418,.455,.482,.503,.420,.403,.392,
507129	*	.372,.361,.337,.326,.296,.275,.224,.176,.076,
507130	*	.116,.274,.369,.428,.468,.495,.421,.403,.394,.373,
507131	*	.363,.343,.332,.309,.292,.258,.220,.157,.113,
507132	*	.118,.277,.376,.438,.477,.422,.405,.395,.374,.364,
507133	*	.345,.336,.314,.304,.275,.260,.211,.166,.073,
507134	*	.120,.279,.380,.441,.422,.405,.395,.375,.366,.345,
507135	*	.337,.317,.308,.284,.271,.239,.206,.145,.107,
507136	*	.122,.286,.388,.422,.405,.396,.375,.366,.347,.340,
507137	*	.319,.313,.290,.280,.253,.238,.192,.154,.071,
507138	*	.123,.290,.422,.405,.396,.376,.367,.347,.340,.320,
507139	*	.314,.293,.284,.259,.245,.213,.186,.132,.098,
507140	*	.124,.423,.405,.396,.376,.367,.348,.340,.321,.315,
507141	*	.293,.286,.262,.253,.224,.211,.169,.139,.065,
507142	*	.423,.405,.396,.376,.367,.348,.340,.321,.315,.294,
507143	*	.286,.263,.255,.227,.215,.178,.151,.073,.013/
507144		DATA R131/.035,.148,.242,.292,.327,.354,.380,.404,.426,.445,
507145	*	.462,.478,.492,.505,.520,.533,.544,.554,.565,
507146	*	.118,.232,.290,.327,.355,.380,.404,.426,.445,.462,
507147	*	.478,.492,.505,.520,.533,.544,.554,.565,.168,
507148	*	.125,.253,.317,.354,.381,.405,.426,.445,.462,.478,
507149	*	.492,.505,.520,.533,.544,.554,.565,.268,.116,
507150	*	.130,.272,.342,.379,.403,.425,.444,.462,.478,.491,
507151	*	.505,.520,.533,.544,.554,.565,.338,.257,.167,
507152	*	.135,.289,.363,.401,.423,.444,.461,.477,.491,.505,
507153	*	.520,.533,.544,.554,.565,.410,.340,.262,.114,
507154	*	.140,.302,.379,.418,.440,.460,.477,.491,.505,.520,
507155	*	.533,.544,.554,.565,.431,.394,.326,.249,.164,
507156	*	.143,.310,.391,.430,.455,.475,.491,.505,.520,.533,
507157	*	.544,.554,.565,.456,.424,.392,.328,.256,.112,
507158	*	.145,.318,.404,.445,.469,.489,.504,.519,.533,.544,
507159	*	.554,.565,.464,.440,.412,.377,.315,.240,.159,
507160	*	.148,.326,.416,.459,.484,.502,.518,.532,.543,.554,
507161	*	.565,.472,.451,.433,.402,.374,.313,.244,.108,
507162	*	.151,.334,.427,.472,.499,.516,.531,.543,.554,.565,
507163	*	.475,.456,.440,.417,.392,.358,.300,.227,.154/
507164		DATA R231/.155,.343,.437,.485,.511,.529,.542,.553,.565,.477,
507165	*	.458,.447,.425,.410,.380,.354,.296,.234,.104,
507166	*	.158,.350,.446,.495,.520,.538,.552,.564,.478,.460,
507167	*	.448,.429,.414,.391,.368,.335,.284,.214,.146,
507168	*	.162,.356,.453,.503,.530,.548,.563,.478,.461,.451,
507169	*	.432,.422,.399,.385,.356,.333,.278,.221,.101,
507170	*	.164,.364,.463,.513,.541,.559,.479,.461,.451,.433,
507171	*	.423,.402,.389,.366,.345,.312,.266,.200,.139,
507172	*	.166,.367,.470,.523,.552,.479,.461,.452,.433,.424,
507173	*	.404,.393,.370,.358,.329,.308,.258,.208,.097,

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507174	*	.168,.374,.478,.531,.479,.462,.452,.434,.424,.405,
507175	*	.394,.372,.360,.336,.318,.285,.245,.184,.130,
507176	*	.170,.376,.485,.479,.463,.452,.434,.425,.405,.394,
507177	*	.373,.363,.339,.325,.296,.279,.232,.190,.090,
507178	*	.173,.384,.479,.463,.452,.434,.425,.405,.394,.374,
507179	*	.363,.340,.327,.300,.285,.253,.221,.163,.117,
507180	*	.175,.479,.463,.452,.434,.425,.405,.396,.374,.364,
507181	*	.340,.329,.303,.290,.261,.245,.201,.168,.082,
507182	*	.479,.463,.452,.434,.425,.405,.396,.374,.364,.340,
507183	*	.329,.304,.292,.262,.248,.209,.181,.093,.018/
507184		DATA R141/.045,.176,.252,.291,.320,.350,.378,.405,.430,.452,
507185	*	.472,.490,.508,.524,.538,.552,.565,.578,.589,
507186	*	.151,.247,.291,.321,.350,.378,.405,.430,.452,.472,
507187	*	.490,.508,.524,.538,.552,.565,.577,.589,.191,
507188	*	.159,.273,.322,.351,.378,.405,.430,.452,.472,.490,
507189	*	.508,.523,.538,.552,.565,.577,.589,.312,.141,
507190	*	.168,.296,.351,.381,.406,.430,.452,.472,.490,.508,
507191	*	.523,.538,.552,.565,.577,.589,.377,.299,.188,
507192	*	.175,.317,.378,.408,.431,.452,.471,.490,.508,.523,
507193	*	.538,.552,.565,.577,.589,.450,.385,.303,.138,
507194	*	.179,.335,.403,.433,.453,.472,.490,.508,.523,.538,
507195	*	.552,.565,.577,.588,.466,.436,.363,.288,.181,
507196	*	.184,.353,.423,.453,.473,.490,.507,.523,.538,.552,
507197	*	.565,.577,.588,.487,.459,.429,.366,.291,.134,
507198	*	.189,.368,.441,.472,.491,.508,.523,.538,.552,.565,
507199	*	.577,.588,.490,.472,.445,.414,.348,.276,.177,
507200	*	.194,.380,.458,.489,.508,.523,.538,.552,.565,.577,
507201	*	.588,.496,.478,.463,.435,.409,.350,.281,.131,
507202	*	.198,.391,.473,.505,.524,.538,.552,.565,.577,.588,
507203	*	.497,.481,.466,.446,.421,.391,.332,.262,.170/
507204		DATA R241/.202,.400,.485,.519,.537,.552,.565,.577,.588,.498,
507205	*	.483,.470,.451,.436,.409,.385,.330,.266,.126,
507206	*	.207,.412,.497,.533,.551,.565,.577,.588,.499,.484,
507207	*	.472,.454,.438,.418,.396,.366,.313,.248,.164,
507208	*	.210,.420,.508,.545,.564,.577,.588,.499,.484,.472,
507209	*	.455,.442,.421,.407,.380,.358,.307,.252,.120,
507210	*	.213,.427,.518,.556,.575,.588,.499,.484,.473,.456,
507211	*	.442,.423,.409,.386,.365,.335,.289,.229,.153,
507212	*	.217,.435,.528,.567,.585,.499,.484,.473,.456,.442,
507213	*	.423,.410,.387,.373,.345,.326,.280,.233,.113,
507214	*	.221,.442,.537,.576,.499,.484,.473,.456,.442,.424,
507215	*	.410,.389,.374,.349,.331,.302,.263,.208,.140,
507216	*	.223,.445,.543,.499,.484,.473,.456,.443,.425,.412,
507217	*	.390,.375,.350,.336,.308,.292,.249,.211,.105,
507218	*	.226,.453,.500,.484,.473,.456,.444,.425,.412,.390,
507219	*	.375,.352,.336,.312,.295,.266,.235,.183,.124,
507220	*	.228,.500,.484,.473,.456,.444,.426,.412,.391,.376,
507221	*	.352,.338,.313,.299,.270,.253,.212,.183,.094,
507222	*	.500,.484,.473,.456,.444,.426,.412,.391,.376,.352,
507223	*	.338,.314,.299,.271,.255,.219,.192,.108,.023/
507224		DATA R151/.052,.194,.255,.286,.311,.335,.359,.386,.413,.440,
507225	*	.462,.483,.503,.521,.537,.551,.563,.576,.587,
507226	*	.176,.251,.285,.310,.334,.359,.385,.413,.440,.462,
507227	*	.483,.503,.521,.537,.551,.563,.576,.587,.211,
507228	*	.187,.273,.308,.333,.358,.385,.413,.439,.462,.483,
507229	*	.503,.521,.537,.551,.563,.576,.587,.351,.164,
507230	*	.197,.302,.337,.360,.385,.412,.439,.462,.483,.503,
507231	*	.521,.537,.551,.563,.576,.587,.405,.338,.205,

Appendix C: MOBILE4 Block Data 07

May 5, 1989

507232	*	.205,.332,.370,.390,.412,.436,.461,.483,.503,.521,
507233	*	.537,.551,.563,.576,.587,.470,.414,.339,.160,
507234	*	.213,.357,.402,.418,.437,.460,.483,.503,.521,.536,
507235	*	.551,.563,.576,.587,.480,.456,.389,.324,.198,
507236	*	.218,.375,.429,.446,.462,.482,.502,.521,.536,.550,
507237	*	.563,.576,.587,.495,.474,.449,.396,.326,.155,
507238	*	.226,.393,.451,.471,.485,.502,.520,.536,.550,.563,
507239	*	.576,.587,.497,.481,.458,.433,.372,.309,.192,
507240	*	.233,.410,.472,.492,.505,.520,.535,.550,.563,.576,
507241	*	.587,.499,.484,.470,.448,.426,.375,.311,.149,
507242	*	.239,.425,.490,.511,.523,.536,.550,.563,.575,.587,
507243	*	.500,.485,.471,.455,.433,.408,.351,.291,.182/
507244		DATA R251/.245,.438,.506,.526,.539,.551,.563,.575,.587,.500,
507245	*	.486,.473,.456,.442,.419,.398,.350,.292,.142,
507246	*	.251,.451,.521,.542,.553,.564,.576,.587,.500,.486,
507247	*	.473,.457,.443,.424,.403,.378,.328,.271,.171,
507248	*	.256,.463,.534,.556,.566,.576,.587,.501,.486,.474,
507249	*	.458,.445,.425,.410,.387,.368,.322,.271,.134,
507250	*	.261,.473,.546,.568,.578,.588,.501,.486,.474,.458,
507251	*	.445,.426,.411,.391,.372,.345,.301,.248,.159,
507252	*	.265,.482,.557,.579,.589,.501,.486,.474,.458,.446,
507253	*	.426,.412,.391,.376,.352,.331,.289,.248,.125,
507254	*	.269,.488,.566,.589,.501,.486,.474,.458,.446,.426,
507255	*	.412,.392,.377,.354,.336,.308,.273,.224,.145,
507256	*	.273,.496,.575,.501,.486,.474,.458,.446,.426,.412,
507257	*	.392,.377,.354,.338,.312,.294,.255,.222,.116,
507258	*	.277,.505,.501,.486,.474,.458,.446,.427,.412,.392,
507259	*	.377,.355,.339,.314,.297,.270,.243,.199,.133,
507260	*	.280,.501,.486,.474,.458,.446,.427,.412,.392,.377,
507261	*	.355,.339,.315,.299,.273,.259,.222,.197,.104,
507262	*	.501,.486,.475,.458,.446,.427,.412,.392,.377,.355,
507263	*	.339,.315,.299,.274,.259,.228,.204,.120,.026/
507264		DATA R112/.030,.118,.174,.210,.233,.254,.271,.283,.296,.309,
507265	*	.320,.332,.346,.359,.369,.381,.392,.403,.415,
507266	*	.096,.161,.203,.228,.251,.269,.281,.294,.307,.318,
507267	*	.330,.343,.358,.368,.379,.391,.401,.413,.052,
507268	*	.090,.161,.204,.234,.258,.274,.287,.300,.310,.323,
507269	*	.336,.349,.363,.374,.386,.396,.407,.093,.045,
507270	*	.091,.165,.209,.240,.265,.280,.294,.304,.317,.330,
507271	*	.343,.357,.368,.380,.391,.402,.131,.091,.052,
507272	*	.088,.162,.208,.243,.268,.285,.300,.312,.325,.338,
507273	*	.352,.363,.374,.386,.397,.167,.132,.091,.045,
507274	*	.091,.165,.214,.250,.270,.291,.304,.318,.331,.346,
507275	*	.360,.371,.382,.392,.187,.164,.129,.090,.052,
507276	*	.088,.162,.215,.251,.274,.295,.310,.324,.337,.353,
507277	*	.365,.376,.387,.208,.189,.164,.130,.090,.045,
507278	*	.086,.161,.217,.250,.278,.296,.313,.328,.345,.360,
507279	*	.371,.383,.225,.208,.185,.160,.125,.088,.051,
507280	*	.085,.163,.220,.255,.283,.302,.320,.336,.352,.365,
507281	*	.376,.236,.222,.206,.183,.159,.126,.089,.045,
507282	*	.085,.166,.225,.261,.286,.307,.325,.343,.357,.369,
507283	*	.242,.230,.216,.201,.180,.155,.123,.087,.051/
507284		DATA R212/.085,.168,.228,.265,.291,.312,.332,.351,.364,.248,
507285	*	.237,.225,.211,.199,.177,.153,.123,.087,.045,
507286	*	.084,.169,.229,.270,.296,.318,.339,.357,.253,.244,
507287	*	.232,.220,.208,.194,.174,.150,.121,.087,.052,
507288	*	.083,.169,.230,.272,.299,.324,.346,.257,.248,.240,
507289	*	.228,.217,.206,.190,.171,.148,.121,.089,.046,

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507290	*	.082,.170,.230,.273,.302,.328,.259,.248,.241,.233,
507291	*	.222,.212,.197,.185,.166,.145,.118,.089,.054,
507292	*	.082,.171,.227,.271,.302,.262,.252,.243,.235,.226,
507293	*	.216,.207,.196,.181,.164,.145,.121,.092,.049,
507294	*	.082,.173,.232,.273,.266,.256,.248,.240,.231,.221,
507295	*	.213,.204,.192,.176,.161,.142,.118,.090,.054,
507296	*	.082,.173,.234,.269,.260,.250,.243,.233,.224,.215,
507297	*	.206,.199,.185,.171,.156,.141,.118,.090,.049,
507298	*	.082,.173,.274,.263,.255,.247,.237,.227,.218,.210,
507299	*	.203,.192,.178,.164,.151,.137,.116,.087,.052,
507300	*	.082,.276,.267,.257,.249,.242,.232,.222,.215,.208,
507301	*	.197,.185,.172,.160,.148,.134,.112,.087,.051,
507302	*	.277,.267,.258,.249,.243,.233,.224,.216,.209,.199,
507303	*	.186,.174,.163,.151,.138,.118,.095,.061,.015/
507304		DATA R122/.049,.185,.253,.291,.317,.336,.353,.370,.385,.401,
507305	*	.415,.427,.437,.449,.460,.470,.481,.492,.503,
507306	*	.161,.243,.284,.314,.334,.351,.369,.384,.399,.413,
507307	*	.425,.436,.448,.459,.469,.480,.491,.501,.087,
507308	*	.161,.246,.291,.321,.340,.360,.377,.392,.406,.417,
507309	*	.430,.441,.453,.464,.475,.485,.494,.161,.083,
507310	*	.158,.246,.294,.323,.345,.364,.380,.395,.408,.420,
507311	*	.432,.443,.453,.463,.473,.483,.210,.161,.087,
507312	*	.158,.249,.297,.328,.351,.369,.385,.399,.412,.425,
507313	*	.436,.447,.458,.467,.478,.255,.211,.160,.083,
507314	*	.159,.253,.303,.335,.359,.378,.393,.407,.420,.431,
507315	*	.443,.453,.463,.473,.280,.253,.209,.162,.090,
507316	*	.158,.254,.307,.340,.364,.382,.398,.412,.423,.434,
507317	*	.445,.455,.465,.303,.279,.250,.209,.162,.084,
507318	*	.158,.256,.312,.346,.369,.387,.402,.416,.428,.439,
507319	*	.449,.459,.314,.296,.271,.244,.203,.159,.087,
507320	*	.158,.256,.313,.349,.372,.392,.407,.420,.432,.442,
507321	*	.452,.324,.308,.290,.266,.240,.201,.155,.081,
507322	*	.156,.257,.316,.353,.378,.396,.411,.423,.435,.445,
507323	*	.332,.319,.303,.285,.262,.237,.197,.153,.086/
507324		DATA R222/.156,.260,.319,.356,.382,.401,.416,.428,.439,.338,
507325	*	.326,.313,.298,.282,.259,.234,.196,.153,.081,
507326	*	.157,.262,.323,.362,.387,.406,.422,.433,.345,.333,
507327	*	.321,.307,.293,.276,.253,.229,.192,.150,.086,
507328	*	.161,.266,.328,.368,.395,.415,.430,.351,.340,.329,
507329	*	.316,.303,.287,.271,.249,.227,.193,.152,.082,
507330	*	.162,.267,.332,.372,.399,.419,.357,.345,.335,.323,
507331	*	.311,.298,.283,.266,.248,.225,.191,.150,.086,
507332	*	.162,.270,.335,.376,.404,.363,.352,.340,.330,.318,
507333	*	.306,.294,.278,.263,.243,.222,.189,.149,.082,
507334	*	.163,.271,.337,.379,.367,.356,.346,.335,.324,.312,
507335	*	.300,.285,.271,.256,.238,.216,.185,.146,.086,
507336	*	.163,.272,.340,.371,.361,.351,.340,.329,.317,.305,
507337	*	.292,.278,.264,.249,.232,.212,.182,.146,.082,
507338	*	.161,.273,.378,.368,.358,.346,.336,.322,.312,.299,
507339	*	.287,.272,.259,.244,.227,.206,.178,.143,.086,
507340	*	.161,.384,.375,.363,.352,.341,.330,.318,.306,.293,
507341	*	.280,.266,.253,.239,.222,.202,.175,.142,.083,
507342	*	.387,.377,.364,.353,.343,.331,.320,.308,.295,.282,
507343	*	.269,.255,.241,.225,.206,.182,.152,.100,.024/
507344		DATA R132/.065,.239,.312,.349,.373,.392,.407,.420,.433,.444,
507345	*	.455,.466,.475,.484,.494,.504,.513,.521,.530,
507346	*	.209,.298,.340,.367,.388,.403,.416,.429,.440,.452,
507347	*	.462,.472,.481,.491,.501,.510,.518,.526,.112,

507348	*	.200,.293,.339,.368,.389,.403,.416,.428,.439,.450,
507349	*	.459,.469,.480,.490,.499,.507,.515,.207,.107,
507350	*	.199,.295,.343,.373,.391,.406,.419,.430,.441,.452,
507351	*	.461,.470,.481,.490,.499,.507,.257,.204,.110,
507352	*	.200,.298,.347,.375,.394,.409,.422,.434,.444,.455,
507353	*	.464,.474,.484,.493,.500,.301,.255,.204,.106,
507354	*	.201,.299,.349,.378,.398,.412,.425,.437,.447,.457,
507355	*	.466,.477,.486,.494,.323,.299,.252,.202,.110,
507356	*	.201,.301,.352,.380,.400,.413,.426,.437,.447,.457,
507357	*	.467,.476,.485,.343,.321,.295,.252,.201,.105,
507358	*	.201,.302,.352,.382,.401,.416,.429,.439,.448,.459,
507359	*	.469,.478,.356,.340,.317,.292,.248,.200,.110,
507360	*	.202,.302,.353,.383,.403,.418,.429,.440,.449,.460,
507361	*	.469,.366,.352,.336,.313,.289,.248,.199,.106,
507362	*	.203,.304,.356,.386,.407,.422,.434,.445,.456,.465,
507363	*	.370,.359,.344,.328,.307,.284,.241,.196,.109/
507364	DATA R232/	.205,.310,.365,.395,.415,.429,.442,.454,.464,.375,
507365	*	.363,.350,.336,.322,.300,.278,.239,.193,.104,
507366	*	.206,.313,.369,.399,.419,.433,.445,.455,.381,.369,
507367	*	.359,.345,.331,.316,.296,.273,.235,.190,.108,
507368	*	.206,.315,.370,.401,.421,.436,.449,.387,.377,.366,
507369	*	.354,.341,.327,.312,.293,.271,.234,.190,.103,
507370	*	.207,.316,.372,.405,.425,.439,.394,.384,.373,.361,
507371	*	.350,.336,.323,.308,.289,.267,.230,.187,.108,
507372	*	.207,.317,.375,.408,.428,.401,.391,.381,.369,.358,
507373	*	.346,.333,.318,.303,.285,.263,.228,.186,.103,
507374	*	.208,.320,.378,.411,.407,.397,.387,.375,.365,.353,
507375	*	.340,.326,.313,.298,.279,.257,.223,.182,.105,
507376	*	.209,.322,.381,.413,.403,.392,.382,.370,.359,.346,
507377	*	.334,.320,.307,.292,.273,.252,.220,.180,.102,
507378	*	.209,.323,.424,.412,.402,.389,.379,.367,.355,.341,
507379	*	.329,.316,.303,.287,.270,.249,.219,.178,.109,
507380	*	.209,.433,.423,.411,.400,.388,.376,.363,.351,.339,
507381	*	.326,.313,.299,.284,.267,.248,.220,.183,.109,
507382	*	.436,.425,.414,.403,.391,.378,.366,.353,.341,.328,
507383	*	.315,.302,.287,.271,.254,.229,.195,.130,.032/
507384	DATA R142/	.078,.281,.351,.382,.402,.419,.433,.444,.456,.466,
507385	*	.476,.485,.494,.503,.512,.519,.526,.532,.537,
507386	*	.255,.341,.377,.399,.416,.430,.441,.453,.463,.474,
507387	*	.483,.492,.501,.510,.517,.524,.530,.535,.130,
507388	*	.253,.344,.382,.404,.421,.433,.444,.455,.466,.475,
507389	*	.484,.493,.502,.510,.516,.523,.529,.241,.125,
507390	*	.249,.346,.386,.409,.423,.436,.447,.458,.467,.477,
507391	*	.486,.494,.503,.510,.517,.523,.293,.238,.128,
507392	*	.244,.346,.387,.410,.424,.437,.448,.458,.467,.478,
507393	*	.487,.495,.501,.509,.516,.340,.290,.237,.124,
507394	*	.242,.346,.389,.412,.427,.439,.450,.460,.469,.479,
507395	*	.487,.494,.500,.508,.360,.336,.288,.236,.129,
507396	*	.239,.345,.390,.413,.429,.441,.451,.461,.471,.479,
507397	*	.487,.493,.499,.380,.358,.333,.288,.236,.124,
507398	*	.237,.346,.392,.415,.432,.444,.454,.462,.472,.480,
507399	*	.487,.493,.387,.374,.351,.329,.282,.233,.127,
507400	*	.237,.347,.395,.419,.434,.445,.455,.465,.472,.480,
507401	*	.487,.394,.380,.367,.346,.322,.280,.230,.122,
507402	*	.238,.349,.397,.422,.437,.448,.459,.467,.474,.481,
507403	*	.400,.388,.375,.362,.340,.318,.275,.227,.127/
507404	DATA R242/	.238,.349,.398,.424,.440,.451,.460,.469,.476,.406,
507405	*	.396,.385,.372,.358,.338,.315,.275,.227,.122,

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507406	*	.239,.351,.402,.429,.445,.455,.463,.471,.413,.402,
507407	*	.392,.380,.368,.354,.334,.313,.273,.225,.127,
507408	*	.242,.357,.409,.436,.452,.462,.471,.418,.408,.398,
507409	*	.387,.377,.363,.350,.331,.310,.271,.225,.122,
507410	*	.244,.359,.412,.438,.454,.465,.425,.415,.405,.395,
507411	*	.384,.372,.360,.345,.327,.307,.267,.223,.129,
507412	*	.244,.362,.415,.442,.456,.431,.422,.412,.402,.392,
507413	*	.381,.368,.355,.341,.324,.304,.269,.225,.125,
507414	*	.244,.363,.417,.444,.438,.428,.419,.409,.400,.388,
507415	*	.377,.364,.352,.338,.321,.301,.266,.223,.132,
507416	*	.245,.365,.419,.444,.435,.426,.417,.405,.396,.384,
507417	*	.373,.361,.350,.335,.317,.299,.266,.225,.128,
507418	*	.247,.368,.455,.444,.436,.424,.415,.403,.394,.381,
507419	*	.370,.358,.345,.329,.313,.293,.262,.222,.133,
507420	*	.250,.466,.457,.447,.436,.424,.413,.401,.390,.377,
507421	*	.366,.353,.338,.324,.308,.289,.258,.222,.131,
507422	*	.469,.460,.450,.438,.426,.415,.404,.392,.380,.368,
507423	*	.354,.340,.326,.310,.293,.266,.233,.157,.039/
507424	DATA R152/	.088,.311,.370,.395,.412,.426,.440,.451,.461,.470,
507425	*	.481,.488,.496,.502,.510,.516,.519,.523,.529,
507426	*	.291,.365,.393,.411,.425,.439,.450,.460,.469,.480,
507427	*	.487,.495,.501,.509,.515,.518,.522,.529,.154,
507428	*	.297,.374,.403,.420,.435,.447,.456,.466,.476,.483,
507429	*	.491,.497,.505,.512,.514,.518,.524,.285,.146,
507430	*	.298,.381,.411,.430,.442,.452,.462,.472,.479,.487,
507431	*	.492,.498,.505,.510,.514,.520,.339,.285,.157,
507432	*	.299,.386,.419,.437,.448,.457,.468,.476,.484,.489,
507433	*	.494,.502,.507,.511,.516,.392,.345,.290,.153,
507434	*	.300,.393,.426,.442,.453,.462,.472,.481,.486,.492,
507435	*	.497,.504,.508,.512,.407,.389,.340,.290,.159,
507436	*	.298,.395,.430,.446,.457,.467,.476,.482,.487,.494,
507437	*	.501,.504,.508,.422,.404,.385,.341,.289,.152,
507438	*	.291,.395,.431,.448,.459,.468,.476,.481,.486,.494,
507439	*	.500,.502,.427,.417,.399,.380,.334,.285,.157,
507440	*	.292,.398,.435,.454,.464,.472,.478,.483,.491,.497,
507441	*	.499,.432,.423,.412,.395,.376,.334,.285,.151,
507442	*	.293,.401,.440,.457,.468,.475,.480,.488,.494,.497,
507443	*	.436,.428,.418,.406,.389,.371,.327,.280,.156/
507444	DATA R252/	.294,.404,.445,.461,.471,.476,.484,.491,.494,.440,
507445	*	.432,.423,.412,.400,.384,.366,.326,.279,.150,
507446	*	.295,.407,.448,.465,.474,.479,.487,.493,.443,.435,
507447	*	.426,.417,.406,.395,.378,.359,.320,.275,.155,
507448	*	.295,.410,.452,.469,.477,.484,.490,.446,.438,.429,
507449	*	.421,.411,.400,.389,.373,.355,.318,.274,.149,
507450	*	.296,.413,.455,.471,.481,.488,.451,.442,.435,.427,
507451	*	.418,.406,.396,.383,.368,.350,.313,.271,.156,
507452	*	.296,.416,.459,.474,.483,.458,.449,.441,.433,.424,
507453	*	.414,.403,.391,.378,.363,.346,.313,.273,.153,
507454	*	.297,.418,.461,.478,.463,.455,.447,.438,.429,.419,
507455	*	.410,.397,.386,.373,.358,.340,.307,.269,.156,
507456	*	.294,.418,.460,.469,.461,.452,.444,.435,.425,.415,
507457	*	.404,.391,.380,.367,.350,.332,.302,.266,.152,
507458	*	.285,.413,.474,.466,.458,.449,.440,.430,.421,.409,
507459	*	.397,.384,.373,.359,.343,.323,.294,.259,.152,
507460	*	.285,.479,.471,.463,.454,.445,.435,.425,.414,.402,
507461	*	.391,.377,.364,.350,.332,.314,.285,.252,.147,
507462	*	.480,.472,.465,.455,.446,.437,.426,.415,.404,.391,
507463	*	.379,.365,.351,.335,.317,.292,.259,.176,.044/

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507465

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END


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508000      BLOCK DATA BD08
508001      C
508002      C BLOCK DATA Subprogram 08: /ICR4VA/
508003      C
508004      C BLOCK DATA 08 initializes the Annual Inspection Tech 4+ I/M credits array.
508005      C
508006      C Common block array subscripts:
508007      C
508008      C CRD4VA(19,2,12,3) - CRD4VA ( IBY, IP, ITECH-3, ITEST )
508009      C
508010      C Common block dictionary:
508011      C
508012      C   Name      Type      Description
508013      C -----
508014      C /ICR4VA/:
508015      C
508016      C CRD4VA    R      Annual I/M credit percentages for LDGV technologies 4 - 15+
508017      C
508018      C Local array subscripts:
508019      C
508020      C A4<J>(19,2,4) - A4<J> ( IBY, IP, ITECHA )
508021      C A8<J>(19,2,3) - A8<J> ( IBY, IP, ITECHB )
508022      C A12<J>(19,2,3) - A12<J> ( IBY, IP, ITECHC )
508023      C
508024      C where J = ITEST = 1,2,3 and ITECHA = technologies 4 - 7
508025      C                               ITECHB = technologies 8 - 11
508026      C                               ITECHC = technologies 12 - 15
508027      C
508028      C Local array dictionary:
508029      C
508030      C The local arrays are all LDGV technology 4+ I/M credit percentages. Their
508031      C names follow the syntax described above. Note that:
508032      C
508033      C A4<J>(1,1,1) EQU to CRD4VA(1,1,1,<J>) (technologies 4 through 7)
508034      C A8<J>(1,1,1) EQU to CRD4VA(1,1,5,<J>) (technologies 8 through 11)
508035      C A12<J>(1,1,1) EQU to CRD4VA(1,1,9,<J>) (technologies 12 through 15)
508036      C
508037      C Notes:
508038      C
508039      C BD 08 was modified for MOBILE4, replacing all credits with values supplied
508040      C by TSS.
508041      C
508042      C
508043      C COMMON /ICR4VA/ CRD4VA(19,2,12,3)
508044      C
508045      C DIMENSION
508046      C * A41(19,2,4), A42(19,2,4), A43(19,2,4),
508047      C * A81(19,2,4), A82(19,2,4), A83(19,2,4),
508048      C * A121(19,2,4), A122(19,2,4), A123(19,2,4)
508049      C
508050      C EQUIVALENCE
508051      C * (CRD4VA(1,1,1,1), A41(1,1,1)), (CRD4VA(1,1,5,1), A81(1,1,1)),
508052      C * (CRD4VA(1,1,1,2), A42(1,1,1)), (CRD4VA(1,1,5,2), A82(1,1,1)),
508053      C * (CRD4VA(1,1,1,3), A43(1,1,1)), (CRD4VA(1,1,5,3), A83(1,1,1)),
508054      C * (CRD4VA(1,1,9,1), A121(1,1,1)),
508055      C * (CRD4VA(1,1,9,2), A122(1,1,1)),
508056      C * (CRD4VA(1,1,9,3), A123(1,1,1))
508057      C

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508058 C For LDGV, technologies 4 - 15 represent my 1981/2/3/4/5/6/7/8/9/90/1/2+.
 508059 C The continuation code for the local arrays is the last digit of the my
 508060 C represented (except + for 0). There are 4 lines per my: 2 for HC and then
 508061 C 2 for CO, 19 cases per pollutant (for benefit years 1 - 19).
 508062 C
 508063 C ITEST = 1 = idle test
 508064 C
 508065 DATA A41/
 508066 1 .015,.060,.088,.108,.120,.133,.150,.162,.174,.184,
 508067 1 .192,.199,.205,.211,.215,.219,.223,.227,.230,
 508068 1 .023,.087,.124,.147,.159,.175,.193,.207,.220,.232,
 508069 1 .241,.249,.256,.262,.268,.272,.277,.281,.284,
 508070 2 .015,.058,.085,.104,.116,.130,.146,.159,.171,.181,
 508071 2 .189,.196,.203,.208,.213,.217,.221,.225,.228,
 508072 2 .022,.084,.120,.143,.155,.171,.191,.205,.218,.230,
 508073 2 .240,.248,.256,.262,.268,.273,.277,.281,.285,
 508074 3 .016,.064,.093,.114,.126,.140,.155,.167,.176,.184,
 508075 3 .192,.199,.205,.211,.216,.220,.224,.227,.230,
 508076 3 .025,.097,.140,.168,.185,.204,.223,.237,.249,.260,
 508077 3 .270,.280,.287,.294,.300,.306,.310,.315,.319,
 508078 4 .019,.072,.104,.125,.139,.152,.165,.175,.183,.191,
 508079 4 .198,.204,.210,.214,.219,.222,.226,.229,.232,
 508080 4 .030,.110,.155,.184,.202,.220,.236,.248,.258,.267,
 508081 4 .277,.285,.293,.299,.305,.309,.314,.318,.321/
 508082 DATA A81/
 508083 5 .018,.069,.100,.121,.134,.148,.160,.169,.177,.184,
 508084 5 .190,.196,.201,.205,.209,.213,.216,.219,.221,
 508085 5 .028,.104,.148,.177,.195,.212,.227,.239,.249,.258,
 508086 5 .267,.275,.282,.288,.293,.298,.302,.306,.309,
 508087 6 .017,.066,.096,.117,.130,.143,.155,.164,.171,.178,
 508088 6 .184,.189,.193,.197,.201,.204,.207,.209,.212,
 508089 6 .026,.099,.142,.170,.188,.205,.220,.232,.241,.250,
 508090 6 .259,.266,.273,.278,.283,.288,.292,.295,.298,
 508091 7 .017,.067,.098,.119,.133,.146,.157,.165,.172,.178,
 508092 7 .183,.188,.192,.196,.199,.202,.205,.207,.209,
 508093 7 .027,.102,.145,.173,.191,.208,.222,.233,.242,.250,
 508094 7 .258,.266,.272,.277,.282,.286,.290,.293,.296,
 508095 8 .017,.067,.097,.119,.132,.145,.155,.163,.170,.176,
 508096 8 .181,.185,.189,.193,.196,.198,.201,.203,.205,
 508097 8 .027,.101,.143,.172,.190,.206,.220,.231,.239,.248,
 508098 8 .255,.262,.268,.273,.278,.282,.285,.289,.292/
 508099 DATA A121/
 508100 9 .017,.067,.097,.118,.132,.145,.155,.162,.169,.174,
 508101 9 .179,.184,.188,.191,.194,.197,.199,.201,.203,
 508102 9 .026,.100,.142,.171,.189,.205,.219,.229,.238,.246,
 508103 9 .254,.261,.266,.271,.276,.280,.283,.287,.289,
 508104 + .017,.066,.096,.117,.131,.144,.154,.161,.168,.173,
 508105 + .178,.182,.186,.189,.192,.195,.197,.199,.201,
 508106 + .026,.099,.141,.169,.187,.204,.217,.228,.236,.244,
 508107 + .252,.259,.264,.269,.274,.278,.281,.284,.287,
 508108 1 .016,.065,.095,.116,.129,.142,.152,.159,.165,.170,
 508109 1 .175,.179,.183,.186,.189,.191,.193,.195,.197,
 508110 1 .025,.098,.139,.167,.185,.201,.215,.225,.233,.241,
 508111 1 .249,.255,.261,.265,.270,.273,.277,.280,.283,
 508112 2 .016,.064,.094,.115,.128,.141,.150,.157,.163,.168,
 508113 2 .173,.177,.180,.183,.186,.188,.190,.192,.193,
 508114 2 .025,.096,.137,.165,.183,.199,.213,.223,.231,.239,
 508115 2 .246,.252,.258,.262,.266,.270,.273,.276,.279/

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508116 C
508117 C ITEST = 2 = 2500 rpm idle test
508118 C
508119 DATA A42/
508120 1 .017,.068,.100,.122,.135,.152,.173,.190,.204,.217,
508121 1 .228,.237,.245,.252,.258,.263,.268,.272,.276,
508122 1 .027,.101,.143,.170,.184,.204,.229,.249,.266,.281,
508123 1 .294,.305,.314,.323,.330,.336,.342,.347,.352,
508124 2 .017,.067,.098,.120,.134,.151,.172,.189,.203,.216,
508125 2 .227,.236,.244,.251,.258,.263,.268,.273,.277,
508126 2 .026,.099,.141,.168,.183,.203,.230,.250,.267,.283,
508127 2 .296,.308,.317,.326,.334,.340,.346,.352,.357,
508128 3 .018,.073,.107,.130,.145,.162,.181,.196,.208,.219,
508129 3 .229,.238,.245,.252,.258,.264,.269,.274,.278,
508130 3 .029,.112,.161,.193,.213,.236,.261,.280,.296,.310,
508131 3 .323,.335,.345,.354,.362,.369,.375,.381,.386,
508132 4 .021,.082,.119,.144,.160,.176,.192,.205,.216,.226,
508133 4 .235,.243,.250,.256,.262,.267,.271,.275,.279,
508134 4 .034,.125,.176,.210,.230,.251,.272,.288,.301,.313,
508135 4 .325,.336,.345,.353,.360,.366,.372,.377,.381/
508136 DATA A82/
508137 5 .021,.081,.118,.143,.159,.175,.191,.203,.213,.222,
508138 5 .231,.238,.244,.250,.255,.260,.264,.267,.271,
508139 5 .032,.121,.173,.207,.228,.249,.269,.284,.297,.308,
508140 5 .320,.330,.338,.346,.353,.358,.364,.368,.373,
508141 6 .020,.080,.116,.142,.158,.175,.190,.201,.211,.219,
508142 6 .227,.234,.239,.245,.249,.253,.257,.260,.263,
508143 6 .031,.119,.170,.204,.226,.246,.266,.281,.293,.304,
508144 6 .315,.325,.333,.340,.346,.352,.357,.361,.365,
508145 7 .021,.082,.120,.146,.163,.179,.193,.204,.212,.220,
508146 7 .228,.234,.239,.244,.248,.252,.255,.259,.261,
508147 7 .032,.122,.174,.208,.230,.251,.268,.282,.293,.304,
508148 7 .314,.323,.331,.338,.344,.349,.354,.358,.362,
508149 8 .021,.082,.120,.147,.164,.180,.193,.204,.212,.220,
508150 8 .227,.232,.238,.242,.246,.250,.253,.256,.258,
508151 8 .032,.122,.174,.209,.231,.251,.268,.282,.292,.303,
508152 8 .313,.321,.328,.335,.341,.346,.350,.354,.358/
508153 DATA A122/
508154 9 .021,.082,.120,.147,.164,.180,.193,.203,.212,.219,
508155 9 .226,.232,.237,.241,.245,.248,.251,.254,.257,
508156 9 .032,.121,.173,.208,.230,.251,.268,.281,.292,.302,
508157 9 .312,.320,.327,.334,.339,.344,.349,.353,.356,
508158 + .021,.082,.120,.146,.164,.180,.193,.203,.211,.218,
508159 + .225,.231,.236,.240,.244,.247,.250,.253,.255,
508160 + .031,.121,.173,.208,.230,.251,.267,.280,.291,.301,
508161 + .311,.319,.326,.332,.338,.343,.347,.351,.355,
508162 1 .020,.082,.120,.146,.164,.180,.193,.202,.210,.217,
508163 1 .224,.229,.234,.238,.241,.244,.247,.250,.252,
508164 1 .031,.120,.172,.207,.229,.250,.266,.279,.289,.299,
508165 1 .309,.317,.324,.330,.335,.340,.344,.348,.351,
508166 2 .020,.082,.119,.146,.164,.180,.192,.202,.209,.216,
508167 2 .222,.227,.232,.236,.239,.242,.245,.247,.249,
508168 2 .031,.119,.171,.206,.229,.249,.266,.278,.288,.298,
508169 2 .307,.315,.322,.328,.333,.338,.342,.345,.349/
508170 C
508171 C ITEST = 3 = loaded idle test
508172 C
508173 DATA A43/

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508174	1	.019,.075,.111,.135,.150,.168,.192,.210,.227,.241,
508175	1	.253,.263,.272,.280,.287,.293,.298,.303,.307,
508176	1	.032,.121,.171,.203,.220,.243,.273,.295,.315,.333,
508177	1	.348,.360,.371,.381,.389,.397,.404,.410,.415,
508178	2	.018,.073,.107,.131,.146,.164,.187,.206,.222,.236,
508179	2	.247,.257,.266,.274,.281,.287,.292,.297,.301,
508180	2	.031,.117,.166,.198,.215,.239,.269,.291,.311,.329,
508181	2	.344,.357,.368,.378,.386,.394,.401,.407,.412,
508182	3	.020,.079,.116,.141,.157,.176,.197,.213,.227,.239,
508183	3	.250,.260,.268,.276,.283,.289,.295,.300,.304,
508184	3	.035,.133,.190,.228,.251,.277,.306,.328,.345,.361,
508185	3	.376,.390,.401,.411,.420,.428,.435,.441,.447,
508186	4	.024,.091,.131,.159,.176,.194,.213,.228,.240,.252,
508187	4	.262,.271,.279,.286,.293,.299,.304,.309,.313,
508188	4	.041,.150,.212,.251,.276,.300,.325,.344,.359,.373,
508189	4	.388,.400,.411,.420,.428,.436,.442,.448,.453/
508190		DATA A83/
508191	5	.023,.089,.129,.156,.173,.191,.209,.223,.234,.244,
508192	5	.253,.261,.269,.275,.281,.286,.290,.294,.298,
508193	5	.039,.146,.206,.246,.271,.295,.318,.336,.350,.364,
508194	5	.377,.388,.398,.406,.414,.421,.427,.432,.437,
508195	6	.022,.087,.126,.154,.171,.189,.205,.218,.228,.237,
508196	6	.245,.253,.259,.265,.270,.274,.278,.282,.285,
508197	6	.037,.142,.201,.241,.266,.291,.312,.329,.342,.355,
508198	6	.367,.377,.387,.394,.401,.408,.413,.418,.423,
508199	7	.023,.090,.130,.158,.176,.194,.209,.221,.230,.239,
508200	7	.247,.254,.260,.265,.269,.274,.277,.281,.284,
508201	7	.038,.146,.206,.247,.273,.296,.316,.332,.344,.356,
508202	7	.368,.378,.386,.394,.400,.406,.411,.416,.420,
508203	8	.023,.090,.131,.159,.177,.195,.209,.220,.229,.237,
508204	8	.245,.251,.256,.261,.266,.269,.273,.276,.279,
508205	8	.038,.145,.206,.247,.273,.296,.316,.330,.342,.353,
508206	8	.365,.374,.382,.389,.396,.401,.406,.411,.415/
508207		DATA A123/
508208	9	.023,.090,.130,.158,.177,.194,.208,.219,.228,.236,
508209	9	.243,.249,.255,.259,.263,.267,.270,.273,.276,
508210	9	.038,.145,.206,.246,.272,.296,.314,.329,.341,.352,
508211	9	.363,.372,.380,.387,.393,.398,.403,.408,.412,
508212	+	.023,.090,.130,.158,.176,.194,.208,.218,.227,.235,
508213	+	.242,.247,.253,.257,.261,.265,.268,.271,.273,
508214	+	.038,.144,.205,.246,.272,.295,.313,.328,.339,.350,
508215	+	.361,.370,.378,.384,.390,.396,.401,.405,.409,
508216	1	.022,.089,.129,.157,.176,.193,.206,.216,.225,.232,
508217	1	.238,.244,.249,.253,.257,.260,.263,.265,.268,
508218	1	.037,.143,.203,.244,.270,.294,.311,.325,.336,.347,
508219	1	.357,.365,.373,.379,.385,.390,.395,.399,.403,
508220	2	.022,.089,.129,.157,.175,.193,.205,.215,.223,.230,
508221	2	.236,.241,.246,.249,.253,.256,.259,.261,.263,
508222	2	.037,.142,.202,.243,.269,.292,.310,.323,.334,.344,
508223	2	.354,.362,.369,.376,.381,.386,.390,.394,.398/
508224	C	
508225		END

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509000      BLOCK DATA BD09
509001      C
509002      C BLOCK DATA Subprogram 09: /ICR4VB/
509003      C
509004      C BLOCK DATA 09 initializes the Biennial Inspection Tech 4+ I/M credits array.
509005      C
509006      C Common block array subscripts:
509007      C
509008      C CRD4VB(19,2,12,3) - CRD4VB ( IBY, IP, ITECH-3, ITEST )
509009      C
509010      C Common block dictionary:
509011      C
509012      C   Name      Type      Description
509013      C   -----
509014      C   /ICR4VB/:
509015      C
509016      C CRD4VB   R      Biennial I/M credit percentages for LDGV technologies 4 - 15+
509017      C
509018      C Local array subscripts:
509019      C
509020      C B4<J>(19,2,4) - B4<J> ( IBY, IP, ITECHA )
509021      C B8<J>(19,2,3) - B8<J> ( IBY, IP, ITECHB )
509022      C B12<J>(19,2,3) - B12<J> ( IBY, IP, ITECHC )
509023      C
509024      C where J = ITEST = 1,2,3 and ITECHA = technologies 4 - 7
509025      C                               ITECHB = technologies 8 - 11
509026      C                               ITECHC = technologies 12 - 15
509027      C
509028      C Local array dictionary:
509029      C
509030      C The local arrays are all LDGV technology 4+ I/M credit percentages. Their
509031      C names follow the syntax described above. Note that:
509032      C
509033      C B4<J>(1,1,1) EQU to CRD4VB(1,1,1,<J>) (technologies 4 through 7)
509034      C B8<J>(1,1,1) EQU to CRD4VB(1,1,5,<J>) (technologies 8 through 11)
509035      C B12<J>(1,1,1) EQU to CRD4VB(1,1,9,<J>) (technologies 12 through 15)
509036      C
509037      C Notes:
509038      C
509039      C BD 09 was added for MOBILE4, using values supplied by TSS.
509040      C
509041      C
509042      C COMMON /ICR4VB/ CRD4VB(19,2,12,3)
509043      C
509044      C DIMENSION
509045      C * B41(19,2,4),B42(19,2,4),B43(19,2,4),
509046      C * B81(19,2,4),B82(19,2,4),B83(19,2,4),
509047      C * B121(19,2,4),B122(19,2,4),B123(19,2,4)
509048      C
509049      C EQUIVALENCE
509050      C *(CRD4VB(1,1,1,1),B41(1,1,1)),(CRD4VB(1,1,5,1),B81(1,1,1)),
509051      C *(CRD4VB(1,1,1,2),B42(1,1,1)),(CRD4VB(1,1,5,2),B82(1,1,1)),
509052      C *(CRD4VB(1,1,1,3),B43(1,1,1)),(CRD4VB(1,1,5,3),B83(1,1,1)),
509053      C *(CRD4VB(1,1,9,1),B121(1,1,1)),
509054      C *(CRD4VB(1,1,9,2),B122(1,1,1)),
509055      C *(CRD4VB(1,1,9,3),B123(1,1,1))
509056      C
509057      C For LDGV, technologies 4 - 15 represent my 1981/2/3/4/5/6/7/8/9/90/1/2+.

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509058 C The continuation code for the local arrays is the last digit of the my
 509059 C represented (except + for 0). There are 4 lines per my: 2 for HC and then
 509060 C 2 for CO, 19 cases per pollutant (for benefit years 1 - 19).
 509061 C
 509062 C ITEST = 1 = idle test
 509063 C
 509064 DATA B41/
 509065 1 .008,.036,.069,.092,.106,.119,.134,.149,.162,.173,
 509066 1 .182,.190,.197,.203,.209,.213,.218,.221,.225,
 509067 1 .012,.052,.097,.126,.141,.155,.173,.190,.204,.217,
 509068 1 .228,.238,.246,.253,.259,.265,.270,.274,.278,
 509069 2 .007,.035,.067,.089,.103,.116,.131,.146,.159,.170,
 509070 2 .179,.188,.195,.201,.206,.211,.216,.220,.223,
 509071 2 .011,.050,.094,.122,.137,.152,.171,.188,.203,.216,
 509072 2 .227,.237,.245,.253,.259,.265,.270,.275,.279,
 509073 3 .008,.038,.073,.097,.112,.126,.140,.154,.165,.174,
 509074 3 .183,.191,.197,.203,.209,.214,.218,.222,.226,
 509075 3 .013,.059,.110,.144,.164,.183,.202,.220,.234,.246,
 509076 3 .257,.267,.276,.284,.291,.297,.303,.308,.312,
 509077 4 .009,.043,.082,.107,.123,.137,.151,.163,.172,.181,
 509078 4 .188,.196,.202,.207,.212,.217,.220,.224,.227,
 509079 4 .015,.066,.122,.158,.180,.198,.216,.231,.243,.253,
 509080 4 .264,.274,.282,.289,.296,.301,.306,.311,.315/
 509081 DATA B81/
 509082 5 .009,.041,.078,.103,.119,.133,.146,.157,.166,.174,
 509083 5 .181,.188,.194,.199,.203,.207,.211,.214,.217,
 509084 5 .014,.063,.117,.151,.173,.191,.208,.223,.235,.245,
 509085 5 .255,.264,.272,.279,.285,.290,.295,.299,.303,
 509086 6 .008,.040,.076,.100,.116,.129,.142,.153,.161,.169,
 509087 6 .175,.181,.187,.191,.195,.199,.202,.205,.208,
 509088 6 .013,.060,.112,.146,.167,.185,.202,.216,.228,.238,
 509089 6 .247,.256,.263,.270,.275,.280,.285,.289,.293,
 509090 7 .009,.041,.077,.102,.118,.132,.144,.154,.162,.169,
 509091 7 .175,.181,.186,.190,.194,.197,.200,.203,.205,
 509092 7 .013,.061,.114,.148,.170,.188,.204,.218,.228,.238,
 509093 7 .247,.255,.262,.268,.274,.279,.283,.287,.290,
 509094 8 .008,.040,.077,.102,.118,.131,.143,.153,.160,.167,
 509095 8 .173,.178,.183,.187,.190,.194,.196,.199,.201,
 509096 8 .013,.061,.113,.147,.169,.187,.203,.216,.226,.235,
 509097 8 .244,.252,.259,.265,.270,.275,.279,.283,.286/
 509098 DATA B121/
 509099 9 .008,.040,.077,.101,.117,.130,.142,.152,.159,.166,
 509100 9 .172,.177,.181,.185,.189,.192,.195,.197,.199,
 509101 9 .013,.060,.112,.146,.168,.186,.202,.214,.225,.234,
 509102 9 .242,.250,.257,.263,.268,.273,.277,.281,.284,
 509103 + .008,.040,.076,.101,.116,.130,.142,.151,.158,.165,
 509104 + .170,.176,.180,.184,.187,.190,.193,.195,.197,
 509105 + .013,.060,.112,.145,.167,.184,.200,.213,.223,.232,
 509106 + .241,.249,.255,.261,.266,.271,.275,.278,.282,
 509107 1 .008,.039,.075,.099,.115,.128,.140,.149,.156,.162,
 509108 1 .168,.173,.177,.180,.184,.186,.189,.191,.193,
 509109 1 .013,.059,.110,.143,.165,.182,.198,.210,.221,.229,
 509110 1 .238,.245,.252,.257,.262,.267,.271,.274,.277,
 509111 2 .008,.039,.074,.098,.114,.127,.139,.147,.154,.160,
 509112 2 .166,.170,.174,.178,.181,.183,.186,.188,.190,
 509113 2 .012,.058,.109,.142,.163,.181,.196,.208,.218,.227,
 509114 2 .235,.242,.249,.254,.259,.263,.267,.271,.274/
 509115 C

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509116 C ITEST = 2 = 2500 rpm idle test
509117 C
509118 DATA B42/
509119 1 .009,.041,.078,.104,.120,.135,.154,.173,.189,.203,
509120 1 .216,.226,.235,.243,.249,.256,.261,.266,.270,
509121 1 .013,.060,.112,.146,.163,.180,.204,.227,.246,.263,
509122 1 .278,.290,.301,.311,.319,.326,.333,.339,.344,
509123 2 .008,.040,.077,.102,.119,.134,.153,.173,.189,.203,
509124 2 .215,.225,.234,.242,.249,.256,.261,.266,.271,
509125 2 .013,.059,.111,.144,.162,.180,.204,.228,.248,.265,
509126 2 .280,.293,.304,.314,.323,.330,.337,.343,.349,
509127 3 .009,.044,.084,.111,.129,.144,.163,.180,.194,.206,
509128 3 .217,.227,.236,.243,.250,.256,.262,.267,.272,
509129 3 .015,.067,.126,.165,.189,.211,.236,.259,.277,.292,
509130 3 .307,.320,.332,.342,.351,.359,.366,.372,.378,
509131 4 .011,.049,.093,.123,.142,.158,.175,.190,.203,.213,
509132 4 .223,.232,.240,.247,.254,.259,.264,.269,.273,
509133 4 .017,.075,.139,.179,.204,.226,.248,.267,.282,.296,
509134 4 .309,.321,.332,.341,.349,.356,.363,.368,.374/
509135 DATA B82/
509136 5 .010,.049,.093,.122,.141,.157,.174,.189,.200,.210,
509137 5 .220,.228,.235,.242,.247,.253,.257,.261,.265,
509138 5 .016,.073,.136,.177,.202,.224,.245,.264,.279,.292,
509139 5 .305,.316,.326,.335,.342,.349,.355,.360,.365,
509140 6 .010,.048,.092,.121,.141,.157,.173,.187,.198,.208,
509141 6 .216,.224,.231,.237,.242,.247,.251,.255,.258,
509142 6 .016,.071,.134,.175,.201,.222,.243,.262,.276,.289,
509143 6 .300,.311,.321,.329,.336,.343,.348,.354,.358,
509144 7 .010,.049,.094,.125,.144,.161,.177,.190,.200,.209,
509145 7 .217,.225,.231,.236,.241,.246,.250,.253,.256,
509146 7 .016,.073,.137,.178,.205,.226,.247,.263,.277,.289,
509147 7 .300,.310,.319,.327,.334,.340,.345,.350,.355,
509148 8 .010,.050,.095,.126,.145,.162,.178,.190,.200,.209,
509149 8 .217,.223,.229,.235,.239,.243,.247,.250,.253,
509150 8 .016,.073,.137,.179,.205,.227,.247,.263,.276,.287,
509151 8 .298,.308,.317,.324,.331,.337,.342,.347,.351/
509152 DATA B122/
509153 9 .010,.050,.095,.126,.146,.162,.178,.190,.200,.208,
509154 9 .216,.223,.229,.234,.238,.242,.246,.249,.252,
509155 9 .016,.073,.137,.178,.205,.227,.247,.263,.275,.287,
509156 9 .298,.307,.316,.323,.330,.336,.341,.345,.350,
509157 + .010,.049,.095,.126,.146,.162,.178,.190,.199,.208,
509158 + .215,.222,.228,.233,.237,.241,.244,.248,.250,
509159 + .016,.073,.136,.178,.205,.227,.246,.262,.275,.286,
509160 + .297,.306,.315,.322,.329,.334,.339,.344,.348,
509161 1 .010,.049,.095,.125,.146,.162,.177,.189,.199,.207,
509162 1 .214,.220,.226,.231,.235,.238,.242,.245,.247,
509163 1 .016,.072,.136,.177,.204,.226,.246,.261,.274,.285,
509164 1 .295,.305,.313,.320,.326,.332,.336,.341,.345,
509165 2 .010,.049,.095,.125,.146,.163,.177,.189,.198,.206,
509166 2 .213,.219,.224,.229,.233,.236,.239,.242,.245,
509167 2 .015,.072,.135,.177,.204,.226,.245,.260,.273,.284,
509168 2 .294,.303,.311,.318,.324,.329,.334,.338,.342/
509169 C
509170 C ITEST = 3 = loaded idle test
509171 C
509172 DATA B43/
509173 1 .010,.045,.087,.115,.133,.149,.171,.192,.210,.226,

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Appendix C: MOBILE4 Block Data 09

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509174	1	.240,.251,.261,.270,.277,.284,.290,.296,.301,
509175	1	.016,.073,.134,.174,.194,.215,.243,.270,.292,.312,
509176	1	.329,.343,.356,.367,.377,.385,.393,.400,.406,
509177	2	.009,.044,.084,.112,.129,.146,.167,.188,.206,.221,
509178	2	.234,.246,.255,.264,.272,.279,.285,.290,.295,
509179	2	.016,.070,.131,.170,.191,.211,.239,.266,.289,.308,
509180	2	.325,.340,.353,.364,.374,.382,.390,.397,.404,
509181	3	.010,.048,.091,.121,.140,.157,.177,.196,.212,.225,
509182	3	.237,.248,.258,.266,.274,.281,.287,.293,.298,
509183	3	.017,.080,.150,.195,.223,.248,.277,.303,.323,.341,
509184	3	.357,.372,.386,.397,.407,.416,.424,.431,.438,
509185	4	.012,.055,.103,.136,.156,.174,.193,.211,.225,.238,
509186	4	.249,.259,.269,.277,.284,.290,.296,.302,.306,
509187	4	.020,.090,.167,.215,.245,.270,.296,.319,.337,.353,
509188	4	.369,.383,.395,.406,.416,.424,.431,.438,.444/
509189		DATA B83/
509190	5	.011,.053,.101,.133,.154,.172,.190,.206,.220,.231,
509191	5	.241,.250,.259,.266,.272,.278,.283,.288,.292,
509192	5	.019,.088,.163,.211,.241,.266,.291,.312,.330,.345,
509193	5	.359,.372,.383,.393,.402,.410,.417,.423,.428,
509194	6	.011,.052,.100,.132,.152,.170,.187,.202,.214,.225,
509195	6	.234,.243,.250,.256,.262,.267,.272,.276,.279,
509196	6	.019,.085,.159,.207,.237,.262,.286,.307,.323,.337,
509197	6	.350,.362,.373,.382,.390,.397,.404,.409,.414,
509198	7	.011,.054,.103,.136,.157,.175,.192,.206,.217,.227,
509199	7	.236,.244,.251,.257,.262,.267,.271,.275,.278,
509200	7	.019,.088,.163,.212,.243,.268,.291,.310,.325,.338,
509201	7	.351,.363,.373,.381,.389,.396,.402,.407,.412,
509202	8	.011,.054,.103,.136,.157,.175,.192,.205,.216,.225,
509203	8	.234,.241,.248,.253,.258,.263,.267,.270,.273,
509204	8	.019,.088,.163,.212,.243,.268,.291,.309,.323,.336,
509205	8	.348,.359,.369,.377,.385,.391,.397,.402,.407/
509206		DATA B123/
509207	9	.011,.054,.103,.136,.157,.175,.191,.205,.215,.224,
509208	9	.232,.240,.246,.251,.256,.260,.264,.268,.271,
509209	9	.019,.087,.163,.211,.242,.268,.290,.308,.322,.335,
509210	9	.347,.357,.367,.375,.382,.389,.394,.399,.404,
509211	+	.011,.054,.103,.136,.157,.175,.191,.204,.214,.223,
509212	+	.231,.238,.244,.249,.254,.258,.262,.265,.268,
509213	+	.019,.087,.162,.211,.242,.267,.289,.307,.321,.333,
509214	+	.345,.356,.365,.373,.380,.386,.392,.397,.401,
509215	1	.011,.054,.103,.135,.157,.174,.190,.202,.212,.221,
509216	1	.228,.235,.240,.245,.250,.254,.257,.260,.263,
509217	1	.019,.086,.161,.209,.241,.266,.288,.305,.318,.330,
509218	1	.341,.352,.360,.368,.375,.381,.386,.391,.395,
509219	2	.011,.053,.102,.135,.156,.174,.189,.201,.211,.219,
509220	2	.226,.232,.238,.242,.246,.250,.253,.256,.258,
509221	2	.018,.085,.160,.208,.240,.265,.286,.303,.316,.328,
509222	2	.339,.348,.357,.364,.371,.377,.382,.386,.391/
509223	C	
509224		END

```

510000      BLOCK DATA BD10
510001      C
510002      C BLOCK DATA Subprogram 10: /NMETH1/,/NMETH2/
510003      C
510004      C BLOCK DATA 10 initializes methane offset values.
510005      C
510006      C Common block array subscripts:
510007      C
510008      C EXMET1(3,6,8,2) - EXMET1 ( 1B, IEXMYG, IV, IR )
510009      C EXMET2(3,10,3) - EXMET2 ( 1B, IEXMYG, IV )
510010      C MYGEXM(6,8,2) - MYGEXM ( IG, IV, IR )
510011      C
510012      C Common block dictionary:
510013      C
510014      C   Name      Type      Description
510015      C -----
510016      C /NMETH1/:
510017      C
510018      C EXMET1      R      methane offset to the basic emission factor (bef), myg 1-6
510019      C MYGEXM      I      the last year of the methane offset model year groups (mygs)
510020      C EXMET1      R      methane offset to the bef, "excess" mygs (7+), low alt & LDGV/T
510021      C LBEXM      I      lower bound (1st my) of the last myg of meth offsets, LDGV/T
510022      C
510023      C /NMETH2/:
510024      C
510025      C IEXMYG      I      index into myg dimension of EXMETi arrays
510026      C IEXARR      I      EXMETi array selection key: 1 = EXMET1 & 2 = EXMET2
510027      C
510028      C Local array subscripts:
510029      C
510030      C EXMLO(3,6,8) - EXMLO ( 1B, IEXMYG, IV )
510031      C EXMHI(3,6,8) - EXMHI ( 1B, IEXMYG, IV )
510032      C IEXMLO(6,8) - IEXMLO ( IG, IV )
510033      C IEXMHI(6,8) - IEXMHI ( IG, IV )
510034      C
510035      C Local array dictionary:
510036      C
510037      C   Name      Type      Description
510038      C -----
510039      C EXMLO      R      low altitude methane offset by bag by myg by vehicle class
510040      C EXMHI      R      high altitude methane offset by bag by myg by vehicle class
510041      C IEXMLO      I      low alt. region methane offset myg upper bounds (last years)
510042      C IEXMHI      I      high alt. region methane offset myg upper bounds (last years)
510043      C
510044      C Notes:
510045      C
510046      C BD 10 was updated for MOBILE4 updating EXMET2.
510047      C BD 10 was updated for MOBILE4, chging the high alt LDGV/T offsets & MYGs.
510048      C
510049      C
510050      COMMON /NMETH1/ EXMET1(3,6,8,2),MYGEXM(6,8,2),EXMET2(3,10,3),LBEXM
510051      COMMON /NMETH2/ IEXMYG,IEXARR
510052      C
510053      DIMENSION EXMLO(3,6,8),EXMHI(3,6,8),IEXMLO(6,8),IEXMHI(6,8)
510054      C
510055      EQUIVALENCE
510056      * (EXMET1(1,1,1,1),EXMLO(1,1,1)),
510057      * (EXMET1(1,1,1,2),EXMHI(1,1,1)),

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510058      * (MYGEXM(1,1,1), IEXMLO(1,1)),
510059      * (MYGEXM(1,1,2), IEXMHI(1,1))
510060  C
510061  C The continuation code for all arrays is IV (1 = LDGV, 2 = LDGT1, etc).
510062  C
510063  C Low alt LDGV kink (myg 4 thru 6, all 3 bags) OK'd by L. Platte, 9/9/87.
510064  C
510065      DATA EXMLO/
510066  C      Bag1 Bag2 Bag3      Bag1 Bag2 Bag3      Bag1 Bag2 Bag3
510067  C      ---- ---- ----      ---- ---- ----      ---- ---- ----
510068      1      .420, .310, .230, .250, .160, .120, .250, .160, .120,
510069      1      .250, .160, .120, .140, .090, .080, .155, .101, .085,
510070      2      .420, .310, .230, .290, .190, .140, .260, .160, .130,
510071      2      .237, .125, .110, .181, .111, .097, .166, .102, .090,
510072      3      .420, .310, .230, .420, .310, .230, .260, .160, .130,
510073      3      .237, .125, .110, .181, .111, .097, .166, .102, .090,
510074      4      .670, .670, .670, .310, .310, .310, .180, .180, .180, 9*.0,
510075      5      .043, .043, .043, .011, .011, .011, .011, .011, .011, 9*.0,
510076      6      .034, .034, .034, .034, .034, .034, .017, .017, .017, 9*.0,
510077      7      .145, .145, .145, .145, .145, .145, .118, .118, .118,
510078      7      .100, .100, .100, 6*.0,
510079      8      .530, .530, .530, .270, .270, .270, .240, .240, .240, 9*.0/
510080  C
510081      DATA EXMHI/
510082  C      Bag1 Bag2 Bag3      Bag1 Bag2 Bag3      Bag1 Bag2 Bag3
510083  C      ---- ---- ----      ---- ---- ----      ---- ---- ----
510084      1      .570, .420, .310, .470, .300, .230, .220, .140, .110,
510085      1      .490, .310, .240, .300, .200, .170, .258, .167, .140,
510086      2      .570, .420, .310, .560, .370, .270, .500, .310, .250,
510087      2      .365, .193, .170, .271, .167, .145, .208, .128, .112,
510088      3      .570, .420, .310, .570, .420, .310, .500, .310, .250,
510089      3      .365, .193, .170, .271, .167, .145, .208, .128, .112,
510090      4      .910, .910, .910, .600, .600, .600, .350, .350, .350, 9*.0,
510091      5      .099, .099, .099, .025, .025, .025, .025, .025, .025, 9*.0,
510092      6      .079, .079, .079, .079, .079, .079, .040, .040, .040,
510093      6      .022, .022, .022, 6*.0,
510094      7      .333, .333, .333, .333, .333, .333, .271, .271, .271,
510095      7      .230, .230, .230, 6*.0,
510096      8      .068, .068, .068, .034, .034, .034, .037, .037, .037, 9*.0/
510097  C
510098      DATA IEXMLO/
510099      1      1974, 1976, 1977, 1979, 1980, 1982,
510100      2      1974, 1978, 1980, 1983, 1984, 1985,
510101      3      1973, 1978, 1980, 1983, 1984, 1985,
510102      4      1978, 1986, 2020, 0000, 0000, 0000,
510103      5      1974, 1979, 2020, 0000, 0000, 0000,
510104      6      1977, 1980, 2020, 0000, 0000, 0000,
510105      7      1977, 1981, 1987, 2020, 0000, 0000,
510106      8      1977, 1979, 2020, 0000, 0000, 0000/
510107  C
510108      DATA IEXMHI/
510109      1      1974, 1976, 1977, 1979, 1980, 1982,
510110      2      1974, 1978, 1980, 1983, 1984, 1985,
510111      3      1973, 1978, 1980, 1983, 1984, 1985,
510112      4      1978, 1986, 2020, 0000, 0000, 0000,
510113      5      1974, 1979, 2020, 0000, 0000, 0000,
510114      6      1978, 1980, 1983, 2020, 0000, 0000,
510115      7      1977, 1981, 1987, 2020, 0000, 0000,

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Appendix C: MOBILE4 Block Data 10

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510116      8      1977, 1979, 2020, 0000, 0000, 0000/
510117      C
510118      DATA EXMET2/
510119      C      Bag1  Bag2  Bag3      Bag1  Bag2  Bag3      Bag1  Bag2  Bag3
510120      1      .111, .075, .067,      .105, .070, .063,      .093, .062, .056,
510121      1      .088, .059, .054,      .079, .053, .049,      .075, .051, .046,
510122      1      .073, .049, .046,      .071, .048, .044,      .067, .046, .042,
510123      1      .065, .044, .041,
510124      2      .139, .085, .076,      .119, .071, .065,      .109, .064, .059,
510125      2      .108, .064, .059,      .108, .064, .058,      .108, .064, .058,
510126      2      .105, .062, .057,      9*.0,
510127      3      .139, .085, .076,      .119, .071, .065,      .109, .064, .059,
510128      3      .108, .064, .059,      .108, .064, .058,      .108, .064, .058,
510129      3      .105, .062, .057,      9*.0/
510130      C
510131      DATA LBEXM/1992/, IEXMYG/1/, IEXARR/1/
510132      C
510133      END

```



```

511000      BLOCK DATA BD11
511001      C
511002      C BLOCK DATA Subprogram 11: /EVAH1A/,/EVAHS1/,/EVAHS2/,
511003      C                               /EVAPAR/,/EVAPHD/,/EVASTD/,
511004      C                               /EVAPGR/
511005      C
511006      C BLOCK DATA 11 initializes the parameters and rates affecting both hot soak
511007      C and diurnal or hot soak alone (Hot soak HC + Diurnal HC = Evaporative HC).
511008      C
511009      C Common block array subscripts:
511010      C
511011      C CLHS (5,2)   - CLHS   ( ISTD , IRVP )
511012      C EFHS (4,2)   - EFHS   ( ISTD , IRVP )
511013      C EVP (4)      - EVP     ( IEVP )
511014      C FINJ (2)      - FINJ    ( 2 )
511015      C GREVP (4,9)   - GREVP   ( IEVP , IV )
511016      C HDHS (2)      - HDHS    ( IRVP )
511017      C HDWGT (2)     - HDWGT   ( IHDSAL )
511018      C HIHS (2)      - HIHS    ( IRVP )
511019      C HSEQ (3,2,12) - HSEQ    ( IFDS , IVV , IEVEQ )
511020      C IVVMAP (5)     - IVVMAP   ( IVGAS )
511021      C KSTD81 (4,3)  - KSTD81   ( IVTAM , IFDS )
511022      C MYGSTD (5,5)  - MYGSTD   ( IG , IVGAS )
511023      C TPHS (7,4,2)  - TPHS     ( ISTD , IVGAS , IRVP )
511024      C VGREVP (4)   - VGREVP   ( IEVP )
511025      C
511026      C Common block dictionary:
511027      C
511028      C   Name      Type      Description
511029      C   -----
511030      C /EVAH1A/:
511031      C
511032      C HIHS       R      High alt, 1972-76, LDGV & LDGT1, HS rates on 2 RVP fuels
511033      C HIADJ1    R      High alt adjustment to low alt based evap rate, default case
511034      C HIADJ2    R      High alt adjustment to low alt based evap rate, 1978-81 case
511035      C
511036      C /EVAHS1/:
511037      C
511038      C HSEQ       R      1981+ LDGV and LDGT1/2 and Cert HS equations parameters
511039      C EFHS       R      EF HS rates for pre-81 LDGV on 2 RVP fuels
511040      C HDHS       R      EF HS rates for pre-1985 HDGV on 2 RVP fuels
511041      C CLHS       R      EF HS rates for MC on 2 RVP fuels for all standards
511042      C
511043      C /EVAHS2/:
511044      C
511045      C TPHS       R      Tampered HS rates for LDGV/T & HDGV on 2 RVP fuels for all stds
511046      C
511047      C /EVAPAR/:
511048      C
511049      C IFDS       I      See Subscript Dictionary
511050      C ISTD      I      Carbureted engine emission standard case
511051      C ISTD      I      TBI engine emission standard case
511052      C ISTD      I      PFI engine emission standard case
511053      C FINJ      R      Fuel-injected fraction of vehicle class IVGAS built in MY,
511054      C                               index is 1 = TBI, 2 = PBI
511055      C
511056      C /EVAPHD/:
511057      C

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511058 C HDSAL R Sales fraction for HDGV weighing < 14000 lbs
511059 C HDWGT R HDGV weighting factor on value returned from EV81 / EVCERT
511060 C IVVMAP I IVGAS to IVV mapping vector
511061 C
511062 C /EVASTD/:
511063 C
511064 C MYGSTD I Model year groups for emission standards by vehicle type
511065 C MAXSTD I Maximum number of myg's for emission standards, given IV
511066 C KSTD81 I Emission standard key for IFDS sensitive 1981+ LDGV/T *OR*
511067 C emission standard key for cert fuel change cases, depending
511068 C on KEYEQ (see IEVPTR comments).
511069 C
511070 C /EVAPGR/:
511071 C
511072 C EVP R Gram evaporative component for a model year
511073 C GREVP R Gram evaporative component for a vehicle type
511074 C VGREVP R Gram evaporative component for all vehicles combined
511075 C
511076 C Local array subscripts:
511077 C
511078 C HSEQ1(3,2,6) - HSEQ1 ( IFDS , IVV , IEVEQ )
511079 C HSEQ2(3,2,6) - HSEQ2 ( IFDS , IVV , IEVEQ )
511080 C
511081 C Local array dictionary:
511082 C
511083 C Name Type Description
511084 C -----
511085 C HSEQ1 R 1981+ LDGV and LDGT1/2 and Cert HS equations parameters
511086 C for IEVEQ = 1-6
511087 C HSEQ2 R 1981+ LDGV and LDGT1/2 and Cert HS equations parameters
511088 C for IEVEQ = 7-12
511089 C
511090 C Notes:
511091 C
511092 C These data structures are in support of the new MOBILE4 evaporative
511093 C emissions calculation methodology.
511094 C BD11 was modified for MOBILE4.
511095 C
511096 C
511097 C COMMON /EVAHIA/ HIHS (2),HIADJ1,HIADJ2
511098 C COMMON /EVAHS1/ HSEQ (3,2,12),EFHS (4,2),HDHS (2),CLHS (5,2)
511099 C COMMON /EVAHS2/ TPHS (7,4,2)
511100 C COMMON /EVAPAR/ IFDS,ISTDC,ISTDT,ISTDP,FINJ (2)
511101 C COMMON /EVAPGR/ EVP (4),GREVP (4,9),VGREVP (4)
511102 C COMMON /EVAPHD/ HDSAL,HDWGT (2),IVVMAP (5)
511103 C COMMON /EVASTD/ MYGSTD (5,5),MAXSTD,KSTD81 (4,3)
511104 C
511105 C DIMENSION HSEQ1 (3,2,6),HSEQ2 (3,2,6)
511106 C
511107 C EQUIVALENCE
511108 C * (HSEQ (1,1,1),HSEQ1 (1,1,1)),
511109 C * (HSEQ (1,1,7),HSEQ2 (1,1,1))
511110 C
511111 C
511112 C /EVAHIA/:
511113 C
511114 C Fuel RVP
511115 C 9.0 11.5

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511116 C      -----
511117 C      DATA HIHS/ 14.07, 20.96/, HIADJ1,HIADJ2/1.30, 2.59/
511118 C
511119 C /EVAHS1/:
511120 C
511121 C HSEQ provides the following coefficients and constants:
511122 C
511123 C Continuation lines a,b,c are the 1981+ LDGV and LDGT1/2 EF HS excess
511124 C RVP effect on HS equation coefficients:
511125 C
511126 C      EXCESS = a + b*RVP + c*RVP**2
511127 C
511128 C Continuation lines d,e,f are the 1981+ LDGV and LDGT1/2 EF HS
511129 C malmaintenance and defect effect RVP equation coefficients:
511130 C
511131 C      M&DHS81 = d + e*RVP + f*RVP**2
511132 C
511133 C Continuation lines g,h are the constant terms of the standard level
511134 C and the insufficient capacity, respectively.
511135 C
511136 C Continuation lines i,j,k,l are the 1981+ LDGV and LDGT1/2 EF HS
511137 C temperature correction factor equation coefficients:
511138 C
511139 C      TCFHS81 = (i + j*HSTEMP + k*HSTEMP**2)/l
511140 C
511141 C
511142 C      CARB      TBI      PFI
511143 C      DATA HSEQ1/
511143 C      a      -2.9402      , -1.46699      , -2.7773      ,
511144 C      a      -2.23545      , -1.46699      , -2.7773      ,
511145 C      b      0.0      , 0.15957      , 0.0      ,
511146 C      b      0.0      , 0.15957      , 0.0      ,
511147 C      c      0.031813      , 0.0      , 0.034146      ,
511148 C      c      0.020194      , 0.0      , 0.034146      ,
511149 C      d      -3.2323      , -1.27791      , -0.1796      ,
511150 C      d      -0.75815      , -1.27791      , -0.1796      ,
511151 C      e      0.72337      , 0.15831      , 0.0      ,
511152 C      e      0.0      , 0.15831      , 0.0      ,
511153 C      f      -0.031813      , 0.0      , 0.005027      ,
511154 C      f      0.012996      , 0.0      , 0.005027 /
511155 C
511156 C      DATA HSEQ2/
511157 C      g      1.06      , 0.70      , 0.70      ,
511158 C      g      1.06      , 0.70      , 0.70      ,
511159 C      h      0.60      , 0.0      , 0.0      ,
511160 C      h      0.60      , 0.0      , 0.0      ,
511161 C      i      -2.4636      , -2.4636      , 0.0      ,
511162 C      i      0.0      , -2.4636      , 0.0      ,
511163 C      j      0.0      , 0.0      , 0.0055541      ,
511164 C      j      0.0055541      , 0.0      , 0.0055541      ,
511165 C      k      0.00056161      , 0.00056161      , 0.0      ,
511166 C      k      0.0      , 0.00056161      , 0.0      ,
511167 C      l      1.31      , 1.31      , 0.46      ,
511168 C      l      0.46      , 1.31      , 0.46      /
511169 C
511170 C Continuation line code for EFHS, HDHS, CLHS and TPHS:
511171 C
511172 C      1 = rate(s) when fuel RVP = 9.0
511173 C      2 = rate(s) when fuel RVP = 11.5

```

```

511174 C
511175 C pre-1971 1971 1972-77 1978-80
511176 DATA EFHS/
511177 1 14.67, 10.91, 8.27, 2.46,
511178 2 22.45, 16.15, 12.32, 4.47/
511179 C
511180 DATA HDHS/
511181 1 18.08,
511182 2 27.66/
511183 C
511184 C pre-1978 1978-79 1980-81 1982-84 1985+
511185 DATA CLHS/
511186 1 4.01, 9.01, 9.64, 9.95, 9.90,
511187 2 6.14, 13.79, 14.75, 15.22, 15.15/
511188 C
511189 C /EVAHS2/:
511190 C
511191 C
511192 C For each set of TPHS continuation lines:
511193 C first = LDGV rates at that RVP
511194 C second = LDGT1 rates at that RVP
511195 C third = LDGT2 rates at that RVP
511196 C fourth = HDGV rates at that RVP
511197 C
511198 DATA TPHS/
511199 1 14.67, 14.67, 14.67, 13.29, 10.36, 5.20, 5.20,
511200 1 14.67, 14.67, 14.67, 13.29, 6.50, 5.20, 5.20,
511201 1 18.08, 13.29, 6.50, 5.20, 5.20, 2*0.,
511202 1 18.08, 14.67, 5*0.,
511203 2 22.45, 22.45, 22.45, 18.50, 17.47, 9.00, 9.00,
511204 2 22.45, 22.45, 22.45, 18.50, 13.85, 9.00, 9.00,
511205 2 27.99, 18.50, 13.85, 9.00, 9.00, 2*0.,
511206 2 27.66, 23.31, 5*0./
511207 C
511208 C /EVAPAR/: These are all parameters set during execution by CCEVRT & IEVPTR.
511209 C Initialization is not necessary, so zeroes are used here.
511210 C
511211 DATA IFDS,ISTDC,ISTDP,ISTDT/4*0/,FINJ/2*0.0/
511212 C
511213 C /EVAPHD/: These values are used in both HS and DU calculations.
511214 C
511215 DATA HDSAL/0.875/, HDWGT/1.5,2.0/, IVVMAP/1,2,2,2,1/
511216 C
511217 C /EVASTD/: The continuation line codes are IVGAS for MYGSTD and IFDS for
511218 C KSTD81.
511219 C
511220 DATA MYGSTD/
511221 1 1970, 1971, 1977, 1980, 0000,
511222 2 1970, 1971, 1977, 1980, 0000,
511223 3 1978, 1980, 0000, 0000, 0000,
511224 4 1984, 2020, 0000, 0000, 0000,
511225 5 1977, 1979, 1981, 1984, 2020/
511226 C
511227 DATA MAXSTD/5/
511228 C
511229 C LDGV LDGT1 LDGT2 HDGV
511230 DATA KSTD81/
511231 1 5, 5, 3, 2,

```

Appendix C: MOBILE4 Block Data 11

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```
511232      2      6,  6,  4,  0,
511233      3      7,  7,  5,  0/
511234      C
511235      C There is no fuel injected case for HDGV presently, thus the 0 in KSTD81.
511236      C
511237      C
511238      C /EVAPGR/: These values are calculated in HOTSOK and DIURNL.
511239      C
511240      DATA EVP/4*0.0/, GREVP/36*0.0/, VGREVP/4*0.0/
511241      END
```


512000	C	Former location of BD 12. Available for new DSECT or renumbering.
512001	C	
512002	C	
512003	C	
512004	C	

```

513000      BLOCK DATA BD13
513001      C
513002      C BLOCK DATA Subprogram 13: /EVADU1/,/EVADU2/
513003      C
513004      C BLOCK DATA 13 initializes the parameters and rates of the diurnal
513005      C component of evaporative HC.
513006      C
513007      C Common block array subscripts:
513008      C
513009      C DUEQ(3,2,10) - DUEQ ( IFDS , IVV , IEVEQ )
513010      C EFDU(4,2) - EFDU ( ISTD , IRVP )
513011      C CLDU(5,2) - CLDU ( ISTD , IRVP )
513012      C HDDU(2) - HDDU ( IRVP )
513013      C HIDU(2) - HIDU ( IRVP )
513014      C R2DU(2,2) - R2DU ( KSTD , IREJN )
513015      C TPDU(8,2) - TPDU ( ISTD , IRVP )
513016      C TPDUAF(7,4,2) - TPDUAF ( ISTD , IVGAS , IDUAF )
513017      C DULIM(3,2) - DULIM ( IFDS , IVV )
513018      C
513019      C Common block dictionary:
513020      C
513021      C      Name      Type      Description
513022      C      -----
513023      C /EVADU1/:
513024      C
513025      C DUEQ      R      1981+ LDGV and LDGT1/2 and Cert DU equations parameters
513026      C EFDU      R      EF DU rates for pre-81 LDGV on 2 RVP fuels
513027      C HDDU      R      EF DU rates for pre-1985 HDGV on 2 RVP fuels
513028      C CLDU      R      EF DU rates for MC on 2 RVP fuels for all standards
513029      C TPDU      R      Tampered DU rates for LDGV & HDGV on 2 RVP fuels for all stds
513030      C
513031      C /EVADU2/:
513032      C
513033      C HIDU      R      High alt, 1972-76, LDGV & LDGT1, DU rates on 2 RVP fuels
513034      C DULIM      R      DU Index limit for using different coefficients
513035      C R2DU      R      values for high RVP diurnal based on altitude and standard
513036      C TPDUAF      R      tampered diurnal adjustment factors by standard, vehicle,
513037      C                  and condition (1=FTP, 2=IN-USE)
513038      C
513039      C Notes:
513040      C
513041      C These data structures are in support of the new MOBILE4 evaporative
513042      C emissions calculation methodology.
513043      C BD13 was modified for MOBILE4.
513044      C
513045      C
513046      C      COMMON /EVADU1/ DUEQ(3,2,10),EFDU(4,2),HDDU(2),CLDU(5,2),TPDU(8,2)
513047      C      COMMON /EVADU2/ HIDU(2),DULIM(3,2),R2DU(2,2),TPDUAF(7,4,2),IDUAF
513048      C
513049      C /EVADU1/:
513050      C
513051      C DUEQ provides the following coefficients and constants:
513052      C
513053      C Continuation lines a,b,c are the 1981+ LDGV and LDGT1/2 EF DU excess
513054      C RVP Index equation coefficients:
513055      C
513056      C      EXCESS = a + b*Index + c*Index**2
513057      C

```

513058 C Continuation lines d,e,f are the 1981+ LDGV and LDGT1/2 EF DU
 513059 C malmaintenance and defect effect index equation coefficients:
 513060 C
 513061 C $M\&DDU81 = d + e*Index + f**Index$
 513062 C
 513063 C Continuation lines g,h are the constant terms of the standard level
 513064 C and the insufficient capacity, respectively.
 513065 C
 513066 C Continuation lines i,j are the excess RVP index equation
 513067 C coefficients if index > DULIM
 513068 C
 513069 C

	CARB	LDGV TBI	PFI	CARB	LDGT1/2 TBI	PFI
513070 C DATA DUEQ/						
513071 a	-1.46	-1.30	-1.30	-1.46	-1.30	-1.30
513072 b	0.0	0.0	0.0	0.0	0.0	0.0
513073 c	1.7987	1.7273	1.5262	2.5999	1.7273	1.5262
513074 d	0.0	0.0	0.0	0.0	0.0	0.0
513075 e	0.0	0.0	0.0	0.0	0.0	0.0
513076 f	0.5527	0.3758	0.2239	0.3949	0.3758	0.2239
513077 g	0.94	1.30	1.30	0.94	1.30	1.30
513078 h	0.52	0.0	0.0	0.52	0.0	0.0
513079 i	-26.6409	-27.5218	-30.9769	-21.1673	-27.5218	-30.9769
513080 j	13.46	13.46	13.46	14.316	13.46	13.46 /

513081 C
 513082 C
 513083 C Continuation line code for EFDU, HDDU and CLDU:
 513084 C
 513085 C 1 = rate(s) when fuel RVP = 9.0
 513086 C 2 = rate(s) when fuel RVP = 11.5
 513087 C
 513088 C pre-1971 1971 1972-77 1978-80
 513089 C DATA EFDU/
 513090 1 26.08, 16.28, 8.98, 5.16,
 513091 2 47.99, 38.58, 23.53, 15.92/
 513092 C
 513093 C DATA HDDU/
 513094 1 42.33,
 513095 2 77.89/
 513096 C
 513097 C pre-1978 1978-79 1980-81 1982-84 1985+
 513098 C DATA CLDU/
 513099 1 6.53, 8.79, 9.13, 9.24, 9.35,
 513100 2 12.02, 16.17, 16.80, 17.00, 17.20/
 513101 C
 513102 C /EVADU2/:
 513103 C
 513104 C Continuation line code for HIDU:
 513105 C
 513106 C 1 = rate when fuel RVP = 9.0
 513107 C 2 = rate when fuel RVP = 11.5
 513108 C
 513109 C
 513110 C DATA HIDU/
 513111 1 17.15,
 513112 2 44.93/
 513113 C
 513114 C Index limit for recomputation of excess RVP effect
 513115 C

Appendix C: MOBILE4 Block Data 13

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```

513116 C          LDGV          LDGT1/2
513117 C          CARB   PFI   TBI   CARB   PFI   TBI
513118 DATA DULIM / 3.7416, 4.4096, 3.8963, 2.7523, 4.4096, 3.8963 /
513119 C
513120 C          Low   |   High
513121 DATA R2DU/1.9581,2.0677, 2.2086,2.3667/
513122 C
513123 C Continuation line code for TPDUAF:
513124 C
513125 C 1 = factor(s) for FTP conditions
513126 C 2 = factor(s) for IN-USE conditions
513127 C
513128 C For each set of TPDUAF continuation lines:
513129 C first = LDGV adjustment factors
513130 C second = LDGT1 adjustment factors
513131 C third = LDGT2 adjustment factors
513132 C fourth = HDGV adjustment factors
513133 C
513134 C          ISTD: 1      2      3      4      5      6      7
513135 C
513136 DATA TPDUAF/
513137 1          1.22, 1.22, 0.92, 0.73, 0.72, 0.72, 0.72,
513138 1          1.22, 1.22, 0.92, 0.73, 0.67, 0.72, 0.72,
513139 1          1.97, 0.73, 0.72, 0.72, 0.72, 2*0.,
513140 1          1.97, 1.05, 5*0.,
513141 2          1.50, 1.50, 1.13, 0.90, 0.89, 0.89, 0.89,
513142 2          1.50, 1.50, 1.13, 0.90, 0.83, 0.89, 0.89,
513143 2          2.44, 0.90, 0.89, 0.89, 0.89, 2*0.,
513144 2          2.44, 1.29, 5*0./
513145 C
513146 END

```

```

514000      BLOCK DATA BD14
514001      C
514002      C BLOCK DATA Subprogram 14: /MPDCOM/,/TPDCOM/
514003      C
514004      C BLOCK DATA 14 initializes the average miles per day and trips per day values.
514005      C
514006      C Common block array subscripts:
514007      C
514008      C VALMPD(2,8) - VALMPD ( 1G, 1V )
514009      C MYGMPD(2,8) - MYGMPD ( 1G, 1V )
514010      C TPDCO(2,5) - TPDCO ( 1MDL, 1V )
514011      C
514012      C Common block dictionary:
514013      C
514014      C   Name      Type      Description
514015      C   -----
514016      C /MPDCOM/:
514017      C
514018      C MAXMPD    1      maximum number of MPD model year groups allowed
514019      C VALMPD    R      average miles per day (MPD)
514020      C MYGMPD    1      last year of MPD model year groups
514021      C
514022      C /TPDCOM/:
514023      C
514024      C TPDCO      R      the coefficients (intercept and slope) of the TPD equation
514025      C
514026      C
514027      C      COMMON /MPDCOM/ MAXMPD,VALMPD(2,8),MYGMPD(2,8)
514028      C      COMMON /TPDCOM/ TPDCO(2,8)
514029      C
514030      C      DATA MAXMPD/2/
514031      C
514032      C Continuation line code is 1V.
514033      C
514034      C Average miles per day
514035      C
514036      C      DATA VALMPD/
514037      C      1      31.1, 0.0,
514038      C      2      26.3, 0.0,
514039      C      3      33.7, 0.0,
514040      C      4      36.7, 0.0,
514041      C      5      31.1, 0.0,
514042      C      6      29.8, 0.0,
514043      C      7      138.3, 0.0,
514044      C      8      8.3, 0.0/
514045      C
514046      C Last year of MPD model year groups
514047      C
514048      C      DATA MYGMPD/
514049      C      1      2020,0000,
514050      C      2      2020,0000,
514051      C      3      2020,0000,
514052      C      4      2020,0000,
514053      C      5      2020,0000,
514054      C      6      2020,0000,
514055      C      7      2020,0000,
514056      C      8      2020,0000/
514057      C

```


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```
514058 C /TPDCOM/:
514059 C
514060 C The intercept and slope of the trips per day by model year equation
514061 C
514062 DATA TPDCO/
514063 1 4.7187, 0.058508,
514064 2 4.7187, 0.058508,
514065 3 4.7187, 0.058508,
514066 4 6.88 , 0.0 ,
514067 5 3.05 , 0.0 ,
514068 6 3.05 , 0.0 ,
514069 7 6.65 , 0.0 ,
514070 8 1.35 , 0.0 /
514071 C
514072 END
```

```

515000      BLOCK DATA BD15
515001      C
515002      C BLOCK DATA Subprogram 15: /CRACOM/
515003      C
515004      C BLOCK DATA 15 initializes the evaporative crankcase HC emissions.
515005      C
515006      C Common block array subscripts:
515007      C
515008      C CRAVAL(3,8,2) - CRAVAL ( IG, IV, IR )
515009      C MYGCRA(3,8,2) - MYGCRA ( IG, IV, IR )
515010      C
515011      C Common block dictionary:
515012      C
515013      C      Name      Type      Description
515014      C      -----
515015      C /CRACOM/:
515016      C
515017      C MAXCRA      I      maximum number of crankcase HC model year groups allowed
515018      C CRAVAL      R      crankcase HC emissions
515019      C MYGCRA      I      last year of crankcase HC model year groups
515020      C
515021      C Local array subscripts:
515022      C
515023      C CRAVLO(3,8) - CRAVLO ( IG, IV )
515024      C CRAVHI(3,8) - CRAVHI ( IG, IV )
515025      C ICRALO(3,8) - ICRALO ( IG, IV )
515026      C ICRAHI(3,8) - ICRAHI ( IG, IV )
515027      C
515028      C Local array dictionary:
515029      C
515030      C      Name      Type      Description
515031      C      -----
515032      C CRAVLO      R      crankcase HC emissions in high altitude region
515033      C CRAVHI      R      crankcase HC emissions in high altitude region
515034      C ICRALO      I      last year of crankcase HC model year groups
515035      C ICRAHI      I      last year of crankcase HC model year groups
515036      C
515037      C
515038      C      COMMON /CRACOM/ MAXCRA,CRAVAL(3,8,2),MYGCRA(3,8,2)
515039      C
515040      C      DIMENSION
515041      C      * CRAVLO(3,8),
515042      C      * CRAVHI(3,8),
515043      C      * ICRALO(3,8),
515044      C      * ICRAHI(3,8)
515045      C
515046      C      EQUIVALENCE
515047      C      * (CRAVAL(1,1,1),CRAVLO(1,1)),
515048      C      * (CRAVAL(1,1,2),CRAVHI(1,1)),
515049      C      * (MYGCRA(1,1,1),ICRALO(1,1)),
515050      C      * (MYGCRA(1,1,2),ICRAHI(1,1))
515051      C
515052      C      DATA MAXCRA/3/
515053      C
515054      C      Value of crankcase HC emissions
515055      C
515056      C      Low altitude region
515057      C

```

```

515058      DATA CRAVLO/
515059      *    4.10,  0.80,  0.00,
515060      *    4.10,  0.80,  0.00,
515061      *    5.70,  0.00,  0.00,
515062      *    5.70,  0.00,  0.00,
515063      *    0.00,  0.00,  0.00,
515064      *    0.00,  0.00,  0.00,
515065      *    0.00,  0.00,  0.00,
515066      *    0.31,  0.00,  0.00/
515067      C
515068      C High altitude region
515069      C
515070      DATA CRAVHI/
515071      *    5.29,  1.03,  0.00,
515072      *    5.29,  1.03,  0.00,
515073      *    7.35,  0.00,  0.00,
515074      *    7.35,  0.00,  0.00,
515075      *    0.00,  0.00,  0.00,
515076      *    0.00,  0.00,  0.00,
515077      *    0.00,  0.00,  0.00,
515078      *    0.40,  0.00,  0.00/
515079      C
515080      C Last year of crankcase HC model year groups
515081      C
515082      C Low altitude region
515083      C
515084      DATA ICRALO/
515085      *    1962,1967,2020,
515086      *    1962,1967,2020,
515087      *    1967,2020,0000,
515088      *    1967,2020,0000,
515089      *    2020,0000,0000,
515090      *    2020,0000,0000,
515091      *    2020,0000,0000,
515092      *    1977,2020,0000/
515093      C
515094      C High altitude region
515095      C
515096      DATA ICRAHI/
515097      *    1962,1967,2020,
515098      *    1962,1967,2020,
515099      *    1967,2020,0000,
515100      *    1967,2020,0000,
515101      *    2020,0000,0000,
515102      *    2020,0000,0000,
515103      *    2020,0000,0000,
515104      *    1977,2020,0000/
515105      C
515106      END

```

```

516000      BLOCK DATA BD16
516001      C
516002      C BLOCK DATA Subprogram 16: /IOUCOM/,/IVPCOM/,/MAXIMA/,/QUITXQ/,/YEARS4/
516003      C
516004      C BLOCK DATA 16 initializes miscellaneous integer-valued parameters.
516005      C
516006      C Common block array subscripts:
516007      C
516008      C   IVPTL(8)  -  IVPTL ( IVLM )
516009      C   IVPTRT(8) -  IVPTRT ( IVTEMP )
516010      C   IVPTRA(8) -  IVPTRA ( IVA )
516011      C   IVPTRB(8) -  IVPTRB ( IVB )
516012      C
516013      C Common block dictionary:
516014      C
516015      C /IOUCOM/: a special format is utilized for the i/o unit number (#)
516016      C           common block:
516017      C
516018      C   Unit#  Usage           Description
516019      C   -----
516020      C   IOUIMD  input    user supplied I/M credits (when IMFLAG=2)
516021      C   IOUGEN  input    user supplied general input data
516022      C   IOUREP  output   formatted report file
516023      C   IOUERR  output   error/warning messages file
516024      C   IOUASK  output   prompting messages file
516025      C
516026      C   Name  Type           Description
516027      C   -----
516028      C /IVPCOM/:
516029      C   IVPTL    I    IV subgroup pointer into MYGSP1 & BFRCOF (see IVLM subscript
516030      C                   definition)
516031      C   IVPTRT   I    IV subgroup pointer into MYGTCTF (see IVTEMP subscript
516032      C                   definition)
516033      C   IVPTRA   I    IV subgroup pointer into SCADJ1, ISGRP & ALHRET (see IVA
516034      C                   subscript definition)
516035      C   IVPTRB   I    IV subgroup pointer into GPBSCO (see IVB subscript
516036      C                   definition)
516037      C
516038      C /QUITXQ/:
516039      C
516040      C
516041      C   NIQUIT   I    switch: 1 = first QUITER call has been made, 0 = it has not
516042      C                   On first call, extra vertical spacing is inserted between the
516043      C                   run title and the QUITER message.
516044      C
516045      C /MAXIMA/:
516046      C
516047      C   MAXVEH   I    maximum number of vehicle types - additional categories
516048      C                   may be created by combining 2 or more of the base 8 types
516049      C                   (LDGT = LDGT1 + LDGT2)
516050      C   MAXLTW   I    maximum number of vehicle types that can be affected by
516051      C                   BIGALH's optional correction factors for a/c, extra load
516052      C                   and trailer towing ( = 3 = LDGV, LDGT1 & LDGT2 )
516053      C   MAXPOL   I    maximum number of pollutants covered by MOBILE4
516054      C                   ( = 3 = HC, CO & NOx )
516055      C   MAXREG   I    maximum number of regions allowed in MOBILE4
516056      C                   ( = 3 = low, high & mid )
516057      C   MAXYRS   I    maximum number of model years in ICY's fleet (1 thru 20+)

```

Appendix C: MOBILE4 Block Data 16

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```

516058 C
516059 C /YEARS4/:
516060 C
516061 C 1Y1941 1 4-digit representation of year 1941
516062 C 1Y1960 1 4-digit representation of year 1960
516063 C 1Y2020 1 4-digit representation of year 2020
516064 C
516065 C Notes:
516066 C
516067 C none
516068 C
516069 C
516070 COMMON /IOUCOM/ IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK
516071 COMMON /IVPCOM/ IVPTRL(8),IVPTRT(8),IVPTRB(8)
516072 COMMON /MAXIMA/ MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS
516073 COMMON /QUITXQ/ NIKUIT
516074 COMMON /YEARS4/ 1Y1941,1Y1960,1Y2020
516075 C
516076 DATA IOUIMD,IOUGEN,IOUREP,IOUERR,IOUASK/4,5,3*6/
516077 C
516078 DATA IVPTRL/1,2,3,0,4,5,0,6/
516079 C
516080 DATA IVPTRT/1,2,3,4,0,0,0,5/
516081 C
516082 DATA IVPTRA/1,2,3,0,0,0,0,4/
516083 C
516084 DATA IVPTRB/0,0,0,1,2,3,4,0/
516085 C
516086 DATA MAXVEH,MAXLTW,MAXPOL,MAXREG,MAXYRS/8,3,3,2,20/
516087 C
516088 DATA NIKUIT/1/
516089 C
516090 DATA 1Y1941,1Y1960,1Y2020/1941,1960,2020/
516091 C
516092 END

```


517000 BLOCK DATA BD17

```

517001 C
517002 C BLOCK DATA Subprogram 17: /TEMPC1/,/TEMPC2/,TEMPC3/,/TEMPC4/,/TEMPS/
517003 C
517004 C BLOCK DATA 17 initializes the temperature correction factor (tcf)
517005 C coefficients and their model year groups (myg), the computed tcf parameters,
517006 C the tcf vector and the cold start CO additive tcf offset parameters.
517007 C The tcf coefficients and offsets have cases with the Fuel Delivery Systems
517008 C (FDS) combined and with them differentiated.
517009 C BD 17 also initializes the following temperatures: ambient, minimum,
517010 C maximum, exhaust, and evaporative
517011 C
517012 C Common block array subscripts:
517013 C
517014 C CHFRAC(3) - CHFRAC ( IB )
517015 C COOTFC(3) - COOTFC ( IGO )
517016 C COOTFD(3) - COOTFD ( IFDS )
517017 C MDLOHI(3) - MDLOHI ( IP )
517018 C MYGCOO(3) - MYGCOO ( IVLDG )
517019 C MYGTFD(3) - MYGTFD ( IVLDG )
517020 C MYGTCF(9,3,5) - MYGTCF ( IG, IP, IVTEMP )
517021 C TCF(3) - TCF ( IB )
517022 C TCFF(3,2) - TCF ( IB, IFUEL )
517023 C TDIFF(3) - TDIFF ( IP )
517024 C TEMAST(3) - TEMAST ( IP )
517025 C TEMEXH(3) - TEMEXH ( IP )
517026 C TEMEVP(6) - TEMEVP ( IHRD )
517027 C TTFC(2,3,9,3) - TTFC ( MDLOHI, IB, IT, IP )
517028 C TTFD(3,3,3) - TTFD ( IB, IP, IFDS )
517029 C TT4(2,6,3) - TT4 ( MDLOHI, IT, IP )
517030 C TT8(2,3,4,3) - TT8 ( MDLOHI, IB, IT, IP )
517031 C
517032 C Common block dictionary:
517033 C
517034 C Name Type Description
517035 C -----
517036 C /TEMPC1/:
517037 C
517038 C TTFC R low/high tcf coefficients for IVLDG with FDSs Combined
517039 C TTFD R low tcf's for IVLDG with FDSs Differentiated
517040 C TT4 R low/high tcf coefficients for HDGV
517041 C TT8 R low/high tcf coefficients for MC
517042 C
517043 C /TEMPC2/:
517044 C
517045 C MAXTCF I maximum number of tcf model year groups allowed
517046 C MYGTCF I the last year of the combined FDS IVTEMP tcf model year groups
517047 C MYGTFD I the first year of differentiating IVLDG tcf by FDS
517048 C ISHIFT I IVLDG MYG shift to change array indexed from TTFC to COOTFC
517049 C
517050 C /TEMPC3/:
517051 C
517052 C MDLOHI I TCF case: 0 = mid (no correction), 1 = low, 2 = high
517053 C TDIFF R difference between entered ambient or calculated
517054 C exhaust temperature & FTP temp
517055 C CHFRAC R computed operating mode fractions for given MY & IV
517056 C TCFF R TCF by fuel type, returned by hi-temp & RVP combined CF case
517057 C TCF R temperature correction factor for each bag

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517058 C
517059 C /TEMPC4/:
517060 C
517061 C MYGCOO I first my for using the CO additive offset, if IVLDG&Bagl&LowT
517062 C LOWCO I switch flags whether or not case of CO additive offset for
517063 C IVLDG cold start/low temperature condition: 1 = no & 2 = yes
517064 C COOTFC R low temp CO offsets (1980/1/2) for IVLDG with FDS Combined
517065 C COOTFD R low temp CO offset for IVLDG with FDS Differentiated
517066 C
517067 C /TEMPS/:
517068 C
517069 C AMBT R user supplied ambient temperature
517070 C TEMMIN R user supplied SCNAME's minimum ambient temperature,
517071 C used as fuel tank minimum temperature in diurnal index,
517072 C exhaust temperature, and evaporative temperature
517073 C calculations
517074 C TEMMAX R user supplied SCNAME's maximum ambient temperature,
517075 C used as fuel tank maximum temperature in diurnal index,
517076 C exhaust temperature, and evaporative temperature
517077 C calculations
517078 C TEMEXH R exhaust temperatures for HC, CO, and NOx
517079 C TEMEVP R evaporative temperatures for diurnal, hot soak,
517080 C and running loss
517081 C TEMAST R = TEMEXH. Used for RVP exhaust CF calculation.
517082 C
517083 C Local array subscripts:
517084 C
517085 C TFCHC(2,3,9) - TFCHC ( MDLOHI, IB, IT )
517086 C TFCCO(2,3,9) - TFCCO ( MDLOHI, IB, IT )
517087 C TFCNOX(2,3,9) - TFCNOX ( MDLOHI, IB, IT )
517088 C
517089 C Local array dictionary:
517090 C
517091 C Name Type Description
517092 C -----
517093 C For the local arrays equivalenced to TTFC:
517094 C
517095 C TFC<IP> R low/high tcf coefficients for pollutant IP by bag and model
517096 C year group for vehicle classes IVLDG, with FDSs Combined.
517097 C
517098 C Notes:
517099 C
517100 C BD 17 was modified for MOBILE4: BD 24 was merged
517101 C into BD 17, coefficients and their corresponding myg's were updated,
517102 C and new parameters were added via new /TEMPC3/ and /TEMPC4/.
517103 C BD17 was modified for MOBILE4 to consolidate temperatures via /TEMPS/
517104 C and to accomodate the new combined RVP & high temperature CF algorithm.
517105 C
517106 C
517107 C COMMON /TEMPC1/TTFC(2,3,9,3),TTFD(3,3,3),TT4(2,6,3),TT8(2,3,4,3)
517108 C COMMON /TEMPC2/ MAXTCF,MYGTCF(9,3,5),MYGTFD(3),ISHIFT
517109 C COMMON /TEMPC3/ MDLOHI(3),TDIFF(3),CHFRAC(3),TCFF(3,2),TCF(3)
517110 C COMMON /TEMPC4/ MYGCOO(3),LOWCO,COOTFC(3),COOTFD(3)
517111 C COMMON /TEMPS/ AMBT,TEMMIN,TEMMAX,TEMEXH(3),TEMEVP(6),TEMAST(3)
517112 C
517113 C DIMENSION TFCHC(2,3,9),TFCCO(2,3,9),TFCNOX(2,3,9)
517114 C
517115 C EQUIVALENCE

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517116      * (TTFC(1,1,1,1),TFCHC(1,1,1)),
517117      * (TTFC(1,1,1,2),TFCCO(1,1,1)),
517118      * (TTFC(1,1,1,3),TFCNOX(1,1,1))
517119      C
517120      C LDGV, LDGT1 and LDGT2 (IVLDG) carbureted
517121      C
517122      C          Bag 1          Bag 2          Bag 3
517123      C AmbT:  Low          High          Low          High          Low          High
517124      C HC
517125      DATA TFCHC/
517126      H-.02062300,-.01438100,-.00240320, .00132190,-.00100810, .00347990,
517127      H-.02446200,-.01255200,-.00320170, .00426670,-.00086884, .00758430,
517128      H-.02125500,-.01088800,-.00052755,-.00047925, .00093659, .00766660,
517129      H-.02142700,-.00661070,-.00039442, .00262880, .00497310, .01232000,
517130      H-.02351700,-.01409500,-.00880570, .02617900,-.00162220, .02429700,
517131      H-.02682, .00000000,-.0075815, .00000000,-.0051660, .00000000,
517132      H-.0327753, .00000000,-.0083176, .00000000,-.0090264, .00000000,
517133      H-.032082, .00000000,-.008513, .00000000,-.0090264, .00000000,
517134      H .00000000, .00000000, .00000000, .00000000, .00000000, .00000000/
517135      C CO (Note: Bag 1/LowT MYG's 6 - 8 0.0 coefs -> neutral mult adj to TAMBAG)
517136      DATA TFCCO/
517137      C-.01348700,-.01469100, .00157840, .00374620, .00110970, .01101400,
517138      C-.02112600,-.03876700,-.00152890, .00846850, .00157490, .02517900,
517139      C-.02084300,-.02116500,-.00599510, .02360300, .00182530, .02848300,
517140      C-.01909100,-.01314600,-.00042373, .02471700, .00579820, .02584800,
517141      C-.02483500,-.01961200,-.00883360, .04853700,-.00115530, .03143900,
517142      C .0, .00000000,-.012478, .00000000,-.0074106, .00000000,
517143      C .0, .00000000,-.014584, .00000000,-.011371, .00000000,
517144      C .0, .00000000,-.014584, .00000000,-.011371, .00000000,
517145      C .00000000, .00000000, .00000000, .00000000, .00000000, .00000000/
517146      C NOX
517147      DATA TFCNOX/
517148      N-.00016897, .00388410,-.00892450,-.00873250,-.00725800,-.01083900,
517149      N-.00025074,-.00103890,-.00597910,-.00924660,-.00626900,-.01010800,
517150      N .00388550,-.01830100,-.00241560,-.01092500,-.00211880,-.01804200,
517151      N-.45504E-4,-.00714200,-.00125750,-.00879100,-.00053153,-.00754700,
517152      N-.00760440,-.02615300,-.00680450,-.01860300,-.00541980,-.02087800,
517153      N-.0019, .00000000,-.0061656, .00000000,-.0049643, .00000000,
517154      N-.0045479, .00000000,-.0074823, .00000000,-.0090882, .00000000,
517155      N-.0047657, .00000000,-.006989, .00000000,-.0090882, .00000000,
517156      N .00000000, .00000000, .00000000, .00000000, .00000000, .00000000/
517157      C
517158      C IVLDG fuel injected (Bag 1 / LowT coef: see Note above on TFCCO)
517159      C
517160      DATA TTFD/
517161      C CARB
517162      H-.039143, -.0060254, -.0047641,
517163      C .0, -.011402, -.0090777,
517164      N-.0043258, -.010664, -.010515,
517165      C TBI
517166      H-.033227, -.013174, -.010889,
517167      C .0, -.022124, -.0090777,
517168      N-.0043258, -.0082652, -.010515,
517169      C PFI
517170      H-.021306, -.0070187, -.005731,
517171      C .0, -.013518, -.0090777,
517172      N-.0043258, -.0053098, -.0061644/
517173      C

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517174 C HDGV
517175 C
517176 DATA TT4/
517177 C HC
517178 H-.00589030, .00134580,
517179 H-.00738700, .00523170,
517180 H-.00497590, .00546510,
517181 H-.00285490, .01008200,
517182 H-.00741070, .02054600,
517183 H-.00928590, .00000000,
517184 C CO
517185 C-.00205760, .0081720,
517186 C-.00455410, .02026800,
517187 C-.00428590, .02412700,
517188 C-.00130850, .02206100,
517189 C-.00771170, .02701900,
517190 C-.00601950, .00000000,
517191 C NOX
517192 N-.00643150, -.00839860,
517193 N-.00554560, -.00868800,
517194 N-.00139690, -.01807900,
517195 N-.00046352, -.00748890,
517196 N-.00575240, -.02159300,
517197 N-.00197330, .00000000/
517198 C
517199 C MC
517200 C
517201 DATA TT8/
517202 C HC
517203 H-.02062300, -.01438100, -.00240320, .00132190, -.00100810, .00347990,
517204 H-.02446200, -.01255200, -.00320170, .00426670, -.00086884, .00758430,
517205 H-.02125500, -.01088800, -.00052755, -.00047925, .00093659, .00766660,
517206 H .00000000, .00000000, .00000000, .00000000, .00000000, .00000000,
517207 C CO
517208 C-.01348700, -.01469100, .00157840, .00374620, .00110970, .01101400,
517209 C-.02112600, -.03876700, -.00152890, .00846850, .00157490, .02517900,
517210 C-.02084300, -.02116500, -.00599510, .02360300, .00182530, .02848300,
517211 C .00000000, .00000000, .00000000, .00000000, .00000000, .00000000,
517212 C NOX
517213 N-.00016897, .00388410, -.00892450, -.00873250, -.00725800, -.01083900,
517214 N-.00025074, -.00103890, -.00597910, -.00924660, -.00626900, -.01010800,
517215 N .00000000, .00000000, .00000000, .00000000, .00000000, .00000000,
517216 N .00000000, .00000000, .00000000, .00000000, .00000000, .00000000/
517217 C
517218 C /TEMPC2/:
517219 C
517220 DATA MAXTCF/9/,MYGTFD/1983,1986,1986/,ISHIFT/5/
517221 C
517222 C Note that the last MYG ub in MYGTCF for IVLDG is the year before the
517223 C MYGTFD FDS differentiation start year. ITCPTR is not called from that
517224 C start year onward, hence there is no need to cover that range in MYGTCF.
517225 C
517226 DATA MYGTCF/
517227 C MYG#: 1 2 3 4 5 6 7 8 9
517228 C LDGV
517229 H 1967,1969,1971,1974,1979,1980,1981,1982,0000,
517230 C 1967,1969,1971,1974,1979,1980,1981,1982,0000,
517231 N 1967,1972,1974,1976,1979,1980,1981,1982,0000,

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517232 C LDGT1
517233 H 1967,1969,1971,1974,1980,1983,1984,1985,0000,
517234 C 1967,1969,1971,1974,1980,1983,1984,1985,0000,
517235 N 1967,1972,1974,1978,1980,1983,1984,1985,0000,
517236 C LDGT2
517237 H 1969,1973,1978,0000,1980,1983,1984,1985,0000,
517238 C 1969,1973,1978,0000,1980,1983,1984,1985,0000,
517239 N 1969,1973,1978,0000,1980,1983,1984,1985,0000,
517240 C HDGV
517241 H 1969,1973,1978,1983,1984,2020,0000,0000,0000,
517242 C 1969,1973,1978,1983,1984,2020,0000,0000,0000,
517243 N 1969,1973,1978,1983,1984,2020,0000,0000,0000,
517244 C MC
517245 H 1977,1979,2020,0000,0000,0000,0000,0000,0000,
517246 C 1977,1979,2020,0000,0000,0000,0000,0000,0000,
517247 N 1977,2020,0000,0000,0000,0000,0000,0000,0000/
517248 C
517249 C /TEMPC3/:
517250 C
517251 DATA MDLOHI/3*0/,TDIFF/3*0.0/,CHFRAC/3*0.0/,TCFF/6*1.0/,TCF/3*1.0/
517252 C
517253 C /TEMPC4/:
517254 C
517255 DATA MYGCC00/1980,1984,1984/, LOWCO/1/
517256 C
517257 C MY1 MY2 MY3
517258 DATA COOTFC/-1.2448, -1.30945, -1.28402/
517259 C
517260 C CARB TBI PFI
517261 DATA COOTFD/-1.2262, -1.2262, -0.65727/
517262 C
517263 C /TEMPS/:
517264 C
517265 DATA AMBT,TEMMIN,TEMMA,TEMEXH,TEMEVP,TEMAST/15*0.0/
517266 C
517267 END

```


518000 BLOCK DATA BD18

518001 C

518002 C BLOCK DATA Subprogram 18: /OPMOD1/

518003 C

518004 C BLOCK DATA 18 initializes the bag fraction coefficients used to compute the

518005 C normalized operating mode and temperature correction factor for LDV/T & MC.

518006 C

518007 C Common block array subscripts:

518008 C

518009 C BFRCOF(8,8,3,6) - BFRCOF (IB, IBFPTR, IP, IVLM)

518010 C BFSTEP(8,12,3,3) - BFSTEP (IB, IBFPTR, IP, IVLM)

518011 C BFR50K(4,12,3) - BFR50K (IB, IBFPTR, IP)

518012 C

518013 C IB = bag fraction coefficient index

518014 C for BFRCOF & BFSTEP:

518015 C = 1,3,5,7 for ZMLs of bag 1, bag 2, bag 3, & FTP, respectively

518016 C = 2,4,6,8 for DRs of bag 1, bag 2, bag 3, & FTP, respectively

518017 C for BFR50K:

518018 C = 1,2,3,4 for >50K DRs of bag 1, bag 2, bag 3, & FTP, respectively

518019 C

518020 C Common block dictionary:

518021 C

Name	Type	Description

/OPMOD1/:		
BFRCOF	R	bag fraction coefficients for LDV/T & MC, except 1981+ LDGV and 1984+ LDGT1/2
BFSTEP	R	bag fraction coefficients for 1981+ LDGV, for <= 50K miles, and for 1984+ LDGT1/2, all miles (both in 1 year steps)
BFR50K	R	bag fraction coefficients for 1981+ LDGV, for > 50K miles

518031 C

518032 C Local array subscripts:

518033 C -----

518034 C BFRN11(8,8) - BFRN11 (IB, IBFPTR)

518035 C BFRN12(8,8) - BFRN12 (IB, IBFPTR)

518036 C BFRN13(8,8) - BFRN13 (IB, IBFPTR)

518037 C BFRN21(8,8) - BFRN21 (IB, IBFPTR)

518038 C BFRN22(8,8) - BFRN22 (IB, IBFPTR)

518039 C BFRN23(8,8) - BFRN23 (IB, IBFPTR)

518040 C BFRN31(8,8) - BFRN31 (IB, IBFPTR)

518041 C BFRN32(8,8) - BFRN32 (IB, IBFPTR)

518042 C BFRN33(8,8) - BFRN33 (IB, IBFPTR)

518043 C BFRN51(8,8) - BFRN51 (IB, IBFPTR)

518044 C BFRN52(8,8) - BFRN52 (IB, IBFPTR)

518045 C BFRN53(8,8) - BFRN53 (IB, IBFPTR)

518046 C BFRN61(8,8) - BFRN61 (IB, IBFPTR)

518047 C BFRN62(8,8) - BFRN62 (IB, IBFPTR)

518048 C BFRN63(8,8) - BFRN63 (IB, IBFPTR)

518049 C BFRN81(8,8) - BFRN81 (IB, IBFPTR)

518050 C BFRN82(8,8) - BFRN82 (IB, IBFPTR)

518051 C BFRN83(8,8) - BFRN83 (IB, IBFPTR)

518052 C BFV1HC(8,12) - BFV1HC (IB, IBFPTR)

518053 C BFV1CO(8,12) - BFV1CO (IB, IBFPTR)

518054 C BFV1NX(8,12) - BFV1NX (IB, IBFPTR)

518055 C BFV2HC(8,12) - BFV2HC (IB, IBFPTR)

518056 C BFV2CO(8,12) - BFV2CO (IB, IBFPTR)

518057 C BFV2NX(8,12) - BFV2NX (IB, IBFPTR)

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518058 C BFV3HC(8,12) - BFV3HC ( 1B, IBFPTR )
518059 C BFV3CO(8,12) - BFV3CO ( 1B, IBFPTR )
518060 C BFV3NX(8,12) - BFV3NX ( 1B, IBFPTR )
518061 C BF50HC(4,12) - BF50HC ( 1B, IBFPTR )
518062 C BF50CO(4,12) - BF50CO ( 1B, IBFPTR )
518063 C BF50NX(4,12) - BF50NX ( 1B, IBFPTR )
518064 C
518065 C Local array dictionary:
518066 C
518067 C      Name          Type          Description
518068 C      -----
518069 C BFRN<IVLM><IP> R      bag fraction coefficients for vehicle type IVLM and
518070 C                        pollutant IP (see subscript definitions for IVLM & IP)
518071 C BFV1<IP abbr> R      bag fraction coefficients for 1981+ LDGV, <= 50K miles,
518072 C                        for pollutant IP (abbreviated HC, CO & NX (NOX) )
518073 C BFV2<IP abbr> R      bag fraction coefficients for 1984+ LDGT1, all miles,
518074 C                        for pollutant IP (abbreviated HC, CO & NX (NOX) )
518075 C BFV3<IP abbr> R      bag fraction coefficients for 1984+ LDGT2, all miles,
518076 C                        for pollutant IP (abbreviated HC, CO & NX (NOX) )
518077 C BF50<IP abbr> R      bag fraction slope only for 1981+ LDGV, > 50K miles,
518078 C                        for pollutant IP (abbreviated HC, CO & NX (NOX) )
518079 C
518080 C Notes:
518081 C
518082 C LDGV HC, CO and NOx BFRCOF are updated for MOBILE4. GPBCOF was removed
518083 C (replaced by /SPEED7/'s GPBSCO) in MOBILE4. Redesigning and renaming the
518084 C data structures was also done in MOBILE4. Bag fractions for LDGV HC & CO
518085 C above & below 50K miles were updated for MOBILE4.
518086 C Updated 1979-83 and new 1984+ LDGT1/2 data were added in MOBILE4.
518087 C Updated MC BFRCOF were added in MOBILE4.
518088 C
518089 C
518090 C      COMMON /OPMOD1/ BFRCOF(8,8,3,6),BFSTEP(8,12,3,3),BFR50K(4,12,3)
518091 C
518092 C      DIMENSION
518093 C      * BFRN11(8,8),BFRN12(8,8),BFRN13(8,8),
518094 C      * BFRN21(8,8),BFRN22(8,8),BFRN23(8,8),
518095 C      * BFRN31(8,8),BFRN32(8,8),BFRN33(8,8),
518096 C      * BFRN51(8,8),BFRN52(8,8),BFRN53(8,8),
518097 C      * BFRN61(8,8),BFRN62(8,8),BFRN63(8,8),
518098 C      * BFRN81(8,8),BFRN82(8,8),BFRN83(8,8),
518099 C      * BFV1HC(8,12),BFV1CO(8,12),BFV1NX(8,12),
518100 C      * BFV2HC(8,12),BFV2CO(8,12),BFV2NX(8,12),
518101 C      * BFV3HC(8,12),BFV3CO(8,12),BFV3NX(8,12),
518102 C      * BF50HC(4,12),BF50CO(4,12),BF50NX(4,12)
518103 C
518104 C      EQUIVALENCE
518105 C      * (BFRCOF(1,1,1,1),BFRN11(1,1)),
518106 C      * (BFRCOF(1,1,2,1),BFRN12(1,1)),
518107 C      * (BFRCOF(1,1,3,1),BFRN13(1,1)),
518108 C      * (BFRCOF(1,1,1,2),BFRN21(1,1)),
518109 C      * (BFRCOF(1,1,2,2),BFRN22(1,1)),
518110 C      * (BFRCOF(1,1,3,2),BFRN23(1,1)),
518111 C      * (BFRCOF(1,1,1,3),BFRN31(1,1)),
518112 C      * (BFRCOF(1,1,2,3),BFRN32(1,1)),
518113 C      * (BFRCOF(1,1,3,3),BFRN33(1,1)),
518114 C      * (BFRCOF(1,1,1,4),BFRN51(1,1)),
518115 C      * (BFRCOF(1,1,2,4),BFRN52(1,1)),

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518116      * (BFRCOF (1,1,3,4),BFRN53(1,1)),
518117      * (BFRCOF (1,1,1,5),BFRN61(1,1)),
518118      * (BFRCOF (1,1,2,5),BFRN62(1,1)),
518119      * (BFRCOF (1,1,3,5),BFRN63(1,1)),
518120      * (BFRCOF (1,1,1,6),BFRN81(1,1)),
518121      * (BFRCOF (1,1,2,6),BFRN82(1,1)),
518122      * (BFRCOF (1,1,3,6),BFRN83(1,1))
518123      C
518124      EQUIVALENCE
518125      * (BFSTEP (1,1,1,1),BFV1HC (1,1)),
518126      * (BFSTEP (1,1,2,1),BFV1CO (1,1)),
518127      * (BFSTEP (1,1,3,1),BFV1NX (1,1)),
518128      * (BFSTEP (1,1,1,2),BFV2HC (1,1)),
518129      * (BFSTEP (1,1,2,2),BFV2CO (1,1)),
518130      * (BFSTEP (1,1,3,2),BFV2NX (1,1)),
518131      * (BFSTEP (1,1,1,3),BFV3HC (1,1)),
518132      * (BFSTEP (1,1,2,3),BFV3CO (1,1)),
518133      * (BFSTEP (1,1,3,3),BFV3NX (1,1)),
518134      * (BFR5OK (1,1,1),BF5OHC (1,1)),
518135      * (BFR5OK (1,1,2),BF5OCO (1,1)),
518136      * (BFR5OK (1,1,3),BF5ONX (1,1))
518137      C
518138      C bag & FTP emissions normalized by zero mile FTP rate
518139      C
518140      C LDGV
518141      C HC
518142      C
518143      C      Bag 1      Bag 2      Bag 3      FTP
518144      C      ZML      DR      ZML      DR      ZML      DR      ZML      DR
518145      C      DATA BFRN11/
518146      * 1.282, 0.025, 0.973, 0.028, 0.839, 0.019, 1.0, 0.0249,
518147      * 1.345, 0.074, 0.946, 0.054, 0.842, 0.048, 1.0, 0.0565,
518148      * 1.345, 0.178, 0.919, 0.118, 0.894, 0.093, 1.0, 0.1235,
518149      * 1.389, 0.044, 0.903, 0.056, 0.891, 0.036, 1.0, 0.0481,
518150      * 1.936, 0.324, 0.734, 0.267, 0.801, 0.210, 1.0, 0.2632,
518151      * 2.200, 0.714, 0.571, 0.171, 0.914, 0.143, 1.0, 0.2752,
518152      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518153      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 /
518154      C CO
518155      C      DATA BFRN12/
518156      * 1.277, 0.033, 1.017, 0.029, 0.758, 0.025, 1.0, 0.0287,
518157      * 1.442, 0.071, 0.996, 0.042, 0.674, 0.033, 1.0, 0.0455,
518158      * 1.553, 0.109, 0.933, 0.079, 0.711, 0.038, 1.0, 0.0740,
518159      * 1.402, 0.054, 0.986, 0.069, 0.723, 0.037, 1.0, 0.0572,
518160      * 1.810, 0.149, 0.861, 0.159, 0.654, 0.093, 1.0, 0.1389,
518161      * 2.397, 0.277, 0.647, 0.061, 0.619, 0.076, 1.0, 0.1096,
518162      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518163      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 /
518164      C NOX
518165      C      DATA BFRN13/
518166      * 1.121, 0.009, 0.785, 0.001, 1.319, -0.009, 1.0, -0.0001,
518167      * 1.161, 0.0 , 0.796, 0.0 , 1.267, 0.0 , 1.0, 0.0 ,
518168      * 1.247, 0.024, 0.779, 0.007, 1.236, 0.028, 1.0, 0.0162,
518169      * 1.295, 0.025, 0.785, 0.008, 1.188, 0.033, 1.0, 0.0183,
518170      * 1.377, 0.050, 0.758, 0.061, 1.177, 0.078, 1.0, 0.0634,
518171      * 1.313, 0.047, 0.811, 0.034, 1.125, 0.054, 1.0, 0.0421,
518172      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518173      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 /
518174      C

```

```

518174 C LDGT1
518175 C HC
518176 DATA BFRN21/
518177 * 1.282 , 0.025 , 0.973 , 0.028 , 0.839 , 0.019 , 1.0 , 0.0249,
518178 * 1.345 , 0.074 , 0.946 , 0.054 , 0.842 , 0.048 , 1.0 , 0.0565,
518179 * 1.345 , 0.178 , 0.919 , 0.118 , 0.894 , 0.093 , 1.0 , 0.1235,
518180 * 1.398 , 0.060 , 0.885 , 0.055 , 0.919 , 0.036 , 1.0 , 0.0508,
518181 * 1.856 , 0.345 , 0.765 , 0.234 , 0.803 , 0.196 , 1.0 , 0.2465,
518182 * 2.0914, 0.4073, 0.6714, 0.2752, 0.8035, 0.2972, 1.0 , 0.3082,
518183 * 2.7957, 0.1898, 0.4428, 0.2024, 0.7084, 0.1645, 1.0 , 0.1898,
518184 * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 /
518185 C CO
518186 DATA BFRN22/
518187 * 1.277 , 0.033 , 1.017 , 0.029 , 0.758 , 0.025 , 1.0 , 0.0287,
518188 * 1.442 , 0.071 , 0.996 , 0.042 , 0.674 , 0.033 , 1.0 , 0.0455,
518189 * 1.553 , 0.109 , 0.933 , 0.079 , 0.711 , 0.038 , 1.0 , 0.0740,
518190 * 1.573 , 0.054 , 0.902 , 0.079 , 0.755 , 0.029 , 1.0 , 0.0602,
518191 * 1.902 , 0.170 , 0.850 , 0.151 , 0.606 , 0.105 , 1.0 , 0.1423,
518192 * 2.0939, 0.3129, 0.6895, 0.1805, 0.7671, 0.1479, 1.0 , 0.1985,
518193 * 2.6454, 0.1633, 0.4526, 0.1020, 0.8032, 0.1076, 1.0 , 0.1163,
518194 * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 /
518195 C NOX
518196 DATA BFRN23/
518197 * 1.121 , 0.009 , 0.785 , 0.001 , 1.319 , -0.009 , 1.0 , -0.0001,
518198 * 1.199 , -0.004 , 0.793 , -0.002 , 1.245 , 0.006 , 1.0 , -0.0002,
518199 * 1.262 , 0.022 , 0.770 , 0.004 , 1.242 , 0.027 , 1.0 , 0.0140,
518200 * 1.296 , 0.012 , 0.781 , 0.004 , 1.195 , 0.016 , 1.0 , 0.0089,
518201 * 1.3666, 0.0444, 0.7444, 0.0278, 1.2111, 0.0333, 1.0 , 0.0333,
518202 * 1.3033, 0.0061, 0.8077, 0.0184, 1.1381, 0.0245, 1.0 , 0.0184,
518203 * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 ,
518204 * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 /
518205 C
518206 C LDGT2
518207 C HC
518208 DATA BFRN31/
518209 * 1.282 , 0.025 , 0.973 , 0.028 , 0.839 , 0.019 , 1.0 , 0.0249,
518210 * 1.345 , 0.074 , 0.946 , 0.054 , 0.842 , 0.048 , 1.0 , 0.0565,
518211 * 1.398 , 0.060 , 0.885 , 0.055 , 0.919 , 0.036 , 1.0 , 0.0508,
518212 * 2.0914, 0.4073, 0.6714, 0.2752, 0.8035, 0.2972, 1.0 , 0.3082,
518213 * 2.7957, 0.1898, 0.4428, 0.2024, 0.7084, 0.1645, 1.0 , 0.1898,
518214 * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 ,
518215 * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 ,
518216 * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 /
518217 C CO
518218 DATA BFRN32/
518219 * 1.277 , 0.033 , 1.017 , 0.029 , 0.758 , 0.025 , 1.0 , 0.0287,
518220 * 1.442 , 0.071 , 0.996 , 0.042 , 0.674 , 0.033 , 1.0 , 0.0455,
518221 * 1.573 , 0.054 , 0.902 , 0.079 , 0.755 , 0.029 , 1.0 , 0.0602,
518222 * 2.0939, 0.3129, 0.6895, 0.1805, 0.7671, 0.1479, 1.0 , 0.1985,
518223 * 2.6454, 0.1633, 0.4526, 0.1020, 0.8032, 0.1076, 1.0 , 0.1163,
518224 * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 ,
518225 * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 ,
518226 * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 /
518227 C NOX
518228 DATA BFRN33/
518229 * 1.121 , 0.009 , 0.785 , 0.001 , 1.319 , -0.009 , 1.0 , -0.0001,
518230 * 1.199 , -0.004 , 0.793 , -0.002 , 1.245 , 0.006 , 1.0 , -0.0002,
518231 * 1.262 , 0.022 , 0.770 , 0.004 , 1.242 , 0.027 , 1.0 , 0.0140,

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Appendix C: MOBILE4 Block Data 18

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518232      * 1.3666, 0.0444, 0.7444, 0.0278, 1.2111, 0.0333, 1.0, 0.0333,
518233      * 1.3033, 0.0061, 0.8077, 0.0184, 1.1381, 0.0245, 1.0, 0.0184,
518234      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518235      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518236      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 /
518237      C
518238      C LDDV
518239      C HC
518240      DATA BFRN51/
518241      * 1.209, 0.071, 1.073, 0.056, 0.703, 0.064, 1.0, 0.0613,
518242      * 1.209, 0.105, 1.073, 0.084, 0.703, 0.088, 1.0, 0.0894,
518243      * 1.209, 0.105, 1.073, 0.084, 0.703, 0.088, 1.0, 0.0894,
518244      * 1.209, 0.105, 1.073, 0.084, 0.703, 0.088, 1.0, 0.0894,
518245      * 1.209, 0.105, 1.073, 0.084, 0.703, 0.088, 1.0, 0.0894,
518246      * 1.349, 0.103, 0.969, 0.138, 0.796, 0.103, 1.0, 0.1212,
518247      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518248      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 /
518249      C CO
518250      DATA BFRN52/
518251      * 1.199, 0.060, 0.935, 0.042, 0.974, 0.051, 1.0, 0.0482,
518252      * 1.199, 0.067, 0.935, 0.048, 0.974, 0.057, 1.0, 0.0544,
518253      * 1.199, 0.067, 0.935, 0.048, 0.974, 0.057, 1.0, 0.0544,
518254      * 1.199, 0.067, 0.935, 0.048, 0.974, 0.057, 1.0, 0.0544,
518255      * 1.199, 0.067, 0.935, 0.048, 0.974, 0.057, 1.0, 0.0544,
518256      * 1.150, 0.061, 0.994, 0.026, 0.899, 0.035, 1.0, 0.0357,
518257      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518258      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 /
518259      C NOX
518260      DATA BFRN53/
518261      * 1.068, 0.026, 0.981, 0.029, 0.985, 0.026, 1.0, 0.0276,
518262      * 1.068, 0.031, 0.981, 0.033, 0.985, 0.030, 1.0, 0.0318,
518263      * 1.068, 0.031, 0.981, 0.033, 0.985, 0.030, 1.0, 0.0318,
518264      * 1.068, 0.031, 0.981, 0.033, 0.985, 0.030, 1.0, 0.0318,
518265      * 1.068, 0.031, 0.981, 0.033, 0.985, 0.030, 1.0, 0.0318,
518266      * 0.969, 0.031, 1.062, 0.047, 0.906, 0.031, 1.0, 0.0393,
518267      * 0.969, 0.031, 1.062, 0.047, 0.906, 0.031, 1.0, 0.0393,
518268      * 0.969, 0.031, 1.062, 0.047, 0.906, 0.031, 1.0, 0.0393/
518269      C
518270      C LDDT
518271      C HC
518272      DATA BFRN61/
518273      * 1.209, 0.112, 1.073, 0.091, 0.703, 0.093, 1.0, 0.0959,
518274      * 1.209, 0.110, 1.073, 0.089, 0.703, 0.092, 1.0, 0.0941,
518275      * 1.209, 0.110, 1.073, 0.089, 0.703, 0.092, 1.0, 0.0941,
518276      * 1.209, 0.115, 1.073, 0.093, 0.703, 0.095, 1.0, 0.0981,
518277      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518278      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518279      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518280      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 /
518281      C CO
518282      DATA BFRN62/
518283      * 1.199, 0.062, 0.935, 0.044, 0.974, 0.053, 1.0, 0.0502,
518284      * 1.199, 0.060, 0.935, 0.043, 0.974, 0.051, 1.0, 0.0487,
518285      * 1.199, 0.057, 0.935, 0.040, 0.974, 0.048, 1.0, 0.0457,
518286      * 1.199, 0.057, 0.935, 0.040, 0.974, 0.048, 1.0, 0.0457,
518287      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518288      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518289      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,

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Appendix C: MOBILE4 Block Data 18

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518290      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 /
518291 C NOX
518292      DATA BFRN63/
518293      * 1.068, 0.033, 0.981, 0.036, 0.985, 0.032, 1.0, 0.0343,
518294      * 1.068, 0.033, 0.981, 0.035, 0.985, 0.032, 1.0, 0.0338,
518295      * 1.068, 0.036, 0.981, 0.038, 0.985, 0.035, 1.0, 0.0368,
518296      * 1.068, 0.071, 0.981, 0.072, 0.985, 0.068, 1.0, 0.0707,
518297      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518298      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518299      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518300      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 /
518301 C
518302 C MC
518303 C HC
518304      DATA BFRN81/
518305      * 1.2823, 0.1059, 0.9726, 0.0774, 0.8393, 0.0843, 1.0, 0.0854,
518306      * 1.2818, 0.7474, 0.9728, 0.5470, 0.8392, 0.5929, 1.0, 0.6012,
518307      * 1.2829, 0.7427, 0.9713, 0.5454, 0.8414, 0.5869, 1.0, 0.5973,
518308      * 1.2827, 0.7173, 0.9726, 0.5289, 0.8389, 0.5653, 1.0, 0.5775,
518309      * 1.2787, 0.7121, 0.9724, 0.5283, 0.8423, 0.5590, 1.0, 0.5743,
518310      * 1.2806, 0.7235, 0.9729, 0.5322, 0.8399, 0.5655, 1.0, 0.5821,
518311      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518312      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 /
518313 C CO
518314      DATA BFRN82/
518315      * 1.2772, 0.1523, 1.0172, 0.0877, 0.7580, 0.0712, 1.0, 0.0964,
518316      * 1.2774, 0.2308, 1.0171, 0.1324, 0.7580, 0.1078, 1.0, 0.1459,
518317      * 1.2776, 0.2284, 1.0171, 0.1314, 0.7579, 0.1068, 1.0, 0.1445,
518318      * 1.2774, 0.2235, 1.0171, 0.1287, 0.7580, 0.1034, 1.0, 0.1414,
518319      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518320      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518321      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518322      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 /
518323 C NOX
518324      DATA BFRN83/
518325      * 1.1112, 0.1984, 0.7937, 0.1191, 1.3097, 0.1191, 1.0, 0.1191,
518326      * 1.1118, 0.0000, 0.7899, 0.0000, 1.3166, 0.0000, 1.0, 0.0000,
518327      * 1.1173, 0.0000, 0.7997, 0.0000, 1.2937, 0.0000, 1.0, 0.0000,
518328      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518329      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518330      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518331      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 ,
518332      * 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0, 0.0 /
518333 C
518334 C 1981+ LDGV <=50K miles bag & FTP emissions normalized by zero mile FTP rate
518335 C The continuation code is the last digit of the model year:
518336 C 1 = 1981/1991, 2 = 1982, etc. Note: & = 1990, % = 2020 (0 can not be used)
518337 C
518338 C LDGV
518339 C HC
518340 C
518341 C      Bag 1      Bag 2      Bag 3      FTP
518342 C      ZML      DR      ZML      DR      ZML      DR      ZML      DR
518343 C      DATA BFV1HC/
518344 1 2.4510, 0.4547, 0.5012, 0.2152, 0.8571, 0.1856, 1.0000, 0.2565,
518345 2 2.4402, 0.4320, 0.5081, 0.2027, 0.8520, 0.1801, 1.0000, 0.2438,
518346 3 2.4754, 0.4360, 0.4941, 0.1874, 0.8521, 0.1928, 1.0000, 0.2401,
518347 4 2.6207, 0.5239, 0.4657, 0.2158, 0.7967, 0.2117, 1.0000, 0.2782,
518348 5 2.6438, 0.4458, 0.4548, 0.2088, 0.8001, 0.1909, 1.0000, 0.2528,

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Appendix C: MOBILE4 Block Data 18

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518348	6	2.6599, 0.3854, 0.4467, 0.2032, 0.8034, 0.1749, 1.0000, 0.2330,
518349	7	2.7111, 0.3905, 0.4349, 0.2100, 0.7873, 0.1748, 1.0000, 0.2376,
518350	8	2.7307, 0.3728, 0.4290, 0.2101, 0.7837, 0.1698, 1.0000, 0.2326,
518351	9	2.7345, 0.3621, 0.4274, 0.2092, 0.7840, 0.1669, 1.0000, 0.2292,
518352	&	2.7383, 0.3515, 0.4257, 0.2084, 0.7843, 0.1640, 1.0000, 0.2257,
518353	1	2.7457, 0.3303, 0.4225, 0.2066, 0.7849, 0.1584, 1.0000, 0.2189,
518354	%	2.7513, 0.3143, 0.4200, 0.2053, 0.7854, 0.1541, 1.0000, 0.2138/

C CO

518355		DATA BFVICO/
518356	1	2.8171, 0.6155, 0.3577, 0.2966, 0.8546, 0.2652, 1.0000, 0.3537,
518357	2	2.7447, 0.6031, 0.3853, 0.2732, 0.8566, 0.2545, 1.0000, 0.3360,
518358	3	2.8699, 0.4792, 0.2877, 0.2286, 0.9484, 0.2591, 1.0000, 0.2885,
518359	4	2.8689, 0.6010, 0.3140, 0.2715, 0.8990, 0.2988, 1.0000, 0.3469,
518360	5	2.7500, 0.5075, 0.3558, 0.2602, 0.9089, 0.2619, 1.0000, 0.3116,
518361	6	2.6623, 0.4372, 0.3863, 0.2514, 0.9168, 0.2344, 1.0000, 0.2850,
518362	7	2.6277, 0.4480, 0.4065, 0.2614, 0.9044, 0.2360, 1.0000, 0.2929,
518363	8	2.5906, 0.4291, 0.4217, 0.2614, 0.9034, 0.2279, 1.0000, 0.2868,
518364	9	2.5747, 0.4169, 0.4274, 0.2600, 0.9046, 0.2231, 1.0000, 0.2822,
518365	&	2.5591, 0.4049, 0.4329, 0.2586, 0.9058, 0.2183, 1.0000, 0.2778,
518366	1	2.5280, 0.3811, 0.4440, 0.2559, 0.9081, 0.2089, 1.0000, 0.2689,
518367	%	2.5048, 0.3633, 0.4522, 0.2538, 0.9099, 0.2019, 1.0000, 0.2622/

C NOX

518368		DATA BFVINX/
518369	1	1.7037, 0.0896, 0.7445, 0.1011, 0.9565, 0.1301, 1.0000, 0.1066,
518370	2	1.6886, 0.1007, 0.7519, 0.1084, 0.9539, 0.1402, 1.0000, 0.1155,
518371	3	1.5084, 0.0673, 0.7760, 0.0507, 1.0438, 0.0717, 1.0000, 0.0599,
518372	4	1.5590, 0.0545, 0.7542, 0.0410, 1.0472, 0.0671, 1.0000, 0.0509,
518373	5	1.5619, 0.0584, 0.7594, 0.0397, 1.0352, 0.0709, 1.0000, 0.0521,
518374	6	1.5638, 0.0619, 0.7641, 0.0387, 1.0248, 0.0743, 1.0000, 0.0532,
518375	7	1.5800, 0.0590, 0.7588, 0.0354, 1.0227, 0.0739, 1.0000, 0.0508,
518376	8	1.5856, 0.0593, 0.7587, 0.0341, 1.0186, 0.0749, 1.0000, 0.0504,
518377	9	1.5865, 0.0599, 0.7595, 0.0338, 1.0165, 0.0755, 1.0000, 0.0505,
518378	&	1.5874, 0.0605, 0.7602, 0.0335, 1.0144, 0.0761, 1.0000, 0.0507,
518379	1	1.5892, 0.0617, 0.7618, 0.0328, 1.0101, 0.0775, 1.0000, 0.0510,
518380	%	1.5906, 0.0627, 0.7630, 0.0324, 1.0067, 0.0785, 1.0000, 0.0512/

C

C 1984+ LDGT1 bag & FTP emissions normalized by zero mile FTP rate

C The continuation code is the last digit of the model year:

C 4 = 1984, 5 = 1985, etc. Note: & = 1990, % = 2020 (0 can not be used)

C

C LDGT1

C HC

518381									
518382									
518383									
518384									
518385									
518386									
518387									
518388									
518389									
518390									
518391									
518392									
518393									
518394									
518395									
518396									
518397									
518398									
518399									
518400									
518401									
518402									
518403									
518404									
518405									

C CO

518406 DATA BFV2CO/
 518407 * 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000,
 518408 * 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000,
 518409 * 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000,
 518410 4 2.5738, 0.2181, 0.3799, 0.1362, 0.9959, 0.1436, 1.0000, 0.1553,
 518411 5 3.4554, 0.1471, 0.2186, 0.0914, 0.6385, 0.0971, 1.0000, 0.1043,
 518412 6 3.2307, 0.1795, 0.3032, 0.1115, 0.6465, 0.1185, 1.0000, 0.1272,
 518413 7 2.8508, 0.2342, 0.4456, 0.1455, 0.6615, 0.1546, 1.0000, 0.1660,
 518414 8 1.5788, 0.1945, 0.8083, 0.1209, 0.9291, 0.1284, 1.0000, 0.1379,
 518415 9 1.5680, 0.1958, 0.8134, 0.1216, 0.9275, 0.1292, 1.0000, 0.1387,
 518416 & 1.5572, 0.1973, 0.8179, 0.1226, 0.9271, 0.1302, 1.0000, 0.1398,
 518417 1 1.5559, 0.1974, 0.8182, 0.1226, 0.9274, 0.1303, 1.0000, 0.1399,
 518418 % 1.5064, 0.2028, 0.8408, 0.1260, 0.9216, 0.1339, 1.0000, 0.1438/
 518419 C NOX
 518420 DATA BFV2NX/
 518421 * 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000,
 518422 * 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000,
 518423 * 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000,
 518424 4 1.0029, 0.1343, 0.9223, 0.0358, 1.1461, 0.0537, 1.0000, 0.0627,
 518425 5 1.1665, 0.0724, 0.8849, 0.0161, 1.0941, 0.0322, 1.0000, 0.0322,
 518426 6 1.2408, 0.0833, 0.8611, 0.0185, 1.0834, 0.0370, 1.0000, 0.0370,
 518427 7 1.3532, 0.0990, 0.8251, 0.0220, 1.0672, 0.0440, 1.0000, 0.0440,
 518428 8 1.3974, 0.1094, 0.8384, 0.0243, 1.0085, 0.0486, 1.0000, 0.0486,
 518429 9 1.3976, 0.1103, 0.8336, 0.0245, 1.0175, 0.0490, 1.0000, 0.0490,
 518430 & 1.4113, 0.1114, 0.8294, 0.0248, 1.0151, 0.0495, 1.0000, 0.0495,
 518431 1 1.4113, 0.1114, 0.8294, 0.0248, 1.0151, 0.0495, 1.0000, 0.0495,
 518432 % 1.4452, 0.1151, 0.8185, 0.0256, 1.0104, 0.0512, 1.0000, 0.0512/
 518433 C
 518434 C 1984+ LDGT2 bag & FTP emissions normalized by zero mile FTP rate
 518435 C The continuation code is the last digit of the model year:
 518436 C 4 = 1984, 5 = 1985, etc. Note: & = 1990, % = 2020 (0 can not be used)
 518437 C
 518438 C LDGT2
 518439 C HC
 518440 C
 518441 C
 518442 C
 518443 C
 518444 C
 518445 C
 518446 C
 518447 C
 518448 C
 518449 C
 518450 C
 518451 C
 518452 C
 518453 C
 518454 C
 518455 C
 518456 C
 518457 C
 518458 C
 518459 C
 518460 C
 518461 C
 518462 C
 518463 C

	Bag 1		Bag 2		Bag 3		FTP	
	ZML	DR	ZML	DR	ZML	DR	ZML	DR
518442	DATA BFV3HC/							
518443	* 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
518444	* 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
518445	* 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
518446	4 2.8662	0.2721	0.6530	0.2902	0.2540	0.2358	1.0000	0.2721
518447	5 3.2436	0.2100	0.2334	0.1867	0.7701	0.1633	1.0000	0.1867
518448	6 3.2304	0.2289	0.2289	0.2035	0.7885	0.1781	1.0000	0.2035
518449	7 3.2688	0.2603	0.2025	0.2314	0.8100	0.2025	1.0000	0.2314
518450	8 2.2349	0.2579	0.6304	0.2292	0.7736	0.2006	1.0000	0.2292
518451	9 2.2349	0.2579	0.6304	0.2292	0.7736	0.2006	1.0000	0.2292
518452	& 2.2349	0.2579	0.6304	0.2292	0.7736	0.2006	1.0000	0.2292
518453	1 2.2349	0.2579	0.6304	0.2292	0.7736	0.2006	1.0000	0.2292
518454	% 2.3023	0.2623	0.6120	0.2331	0.7577	0.2040	1.0000	0.2331/
518455	C CO							
518456	DATA BFV3CO/							
518457	* 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
518458	* 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
518459	* 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
518460	4 2.5738	0.2181	0.3799	0.1362	0.9959	0.1436	1.0000	0.1553
518461	5 3.4554	0.1471	0.2186	0.0914	0.6385	0.0971	1.0000	0.1043
518462	6 3.2307	0.1795	0.3032	0.1115	0.6465	0.1185	1.0000	0.1272
518463	7 2.8508	0.2342	0.4456	0.1455	0.6615	0.1546	1.0000	0.1660

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518464	8	1.5788, 0.1945, 0.8083, 0.1209, 0.9291, 0.1284, 1.0000, 0.1379,
518465	9	1.5680, 0.1958, 0.8134, 0.1216, 0.9275, 0.1292, 1.0000, 0.1387,
518466	&	1.5572, 0.1973, 0.8179, 0.1226, 0.9271, 0.1302, 1.0000, 0.1398,
518467	1	1.5559, 0.1974, 0.8182, 0.1226, 0.9274, 0.1303, 1.0000, 0.1399,
518468	%	1.5064, 0.2028, 0.8408, 0.1260, 0.9216, 0.1339, 1.0000, 0.1438/

C NOX

518470	DATA BFV3NX/	
518471	*	0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000,
518472	*	0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000,
518473	*	0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000,
518474	4	1.0029, 0.1343, 0.9223, 0.0358, 1.1461, 0.0537, 1.0000, 0.0627,
518475	5	1.1665, 0.0724, 0.8849, 0.0161, 1.0941, 0.0322, 1.0000, 0.0322,
518476	6	1.2408, 0.0833, 0.8611, 0.0185, 1.0834, 0.0370, 1.0000, 0.0370,
518477	7	1.3532, 0.0990, 0.8251, 0.0220, 1.0672, 0.0440, 1.0000, 0.0440,
518478	8	1.3974, 0.1094, 0.8384, 0.0243, 1.0085, 0.0486, 1.0000, 0.0486,
518479	9	1.3976, 0.1103, 0.8336, 0.0245, 1.0175, 0.0490, 1.0000, 0.0490,
518480	&	1.4113, 0.1114, 0.8294, 0.0248, 1.0151, 0.0495, 1.0000, 0.0495,
518481	1	1.4113, 0.1114, 0.8294, 0.0248, 1.0151, 0.0495, 1.0000, 0.0495,
518482	%	1.4452, 0.1151, 0.8185, 0.0256, 1.0104, 0.0512, 1.0000, 0.0512/

C

518484 C 1981+ LDGV >50K miles bag & FTP det rates normalized by zero mile FTP rate

518485 C The continuation code is the last digit of the model year:

518486 C 1 = 1981/1991, 2 = 1982, etc. Note: & = 1990, % = 2020 (0 can not be used)

518487 C

518488 C LDGV

518489 C HC

518490 C

		Bag 1	Bag 2	Bag 3	FTP
		DR	DR	DR	DR
518491	C	DATA BF50HC/			
518492					
518493	1	0.5919,	0.3136,	0.2381,	0.3503,
518494	2	0.5629,	0.2936,	0.2363,	0.3334,
518495	3	0.6417,	0.2214,	0.2673,	0.3205,
518496	4	0.7405,	0.2389,	0.2815,	0.3538,
518497	5	0.6159,	0.2536,	0.2583,	0.3295,
518498	6	0.5201,	0.2645,	0.2406,	0.3106,
518499	7	0.5154,	0.2741,	0.2384,	0.3140,
518500	8	0.4838,	0.2802,	0.2322,	0.3091,
518501	9	0.4665,	0.2824,	0.2290,	0.3057,
518502	&	0.4494,	0.2845,	0.2258,	0.3024,
518503	1	0.4153,	0.2887,	0.2194,	0.2959,
518504	%	0.3897,	0.2919,	0.2146,	0.2909/

C CO

518506	DATA BF50CO/	
518507	1	0.8042, 0.5154, 0.4212, 0.5492,
518508	2	0.7700, 0.4642, 0.4018, 0.5102,
518509	3	0.5760, 0.3036, 0.3650, 0.3765,
518510	4	0.6754, 0.3372, 0.4027, 0.4247,
518511	5	0.6091, 0.3241, 0.3433, 0.3880,
518512	6	0.5592, 0.3140, 0.2992, 0.3605,
518513	7	0.5709, 0.3206, 0.2937, 0.3648,
518514	8	0.5586, 0.3193, 0.2784, 0.3574,
518515	9	0.5500, 0.3176, 0.2706, 0.3526,
518516	&	0.5415, 0.3160, 0.2629, 0.3479,
518517	1	0.5247, 0.3127, 0.2476, 0.3386,
518518	%	0.5122, 0.3103, 0.2362, 0.3316/

C NOX

518519	DATA BF50NX/	
518520		
518521	1	0.0896, 0.1011, 0.1301, 0.1066,

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518522	2	0.1007,	0.1084,	0.1402,	0.1155,
518523	3	0.0673,	0.0507,	0.0717,	0.0599,
518524	4	0.0545,	0.0410,	0.0671,	0.0509,
518525	5	0.0584,	0.0397,	0.0709,	0.0521,
518526	6	0.0619,	0.0387,	0.0743,	0.0532,
518527	7	0.0590,	0.0354,	0.0739,	0.0508,
518528	8	0.0593,	0.0341,	0.0749,	0.0504,
518529	9	0.0599,	0.0338,	0.0755,	0.0505,
518530	&	0.0605,	0.0335,	0.0761,	0.0507,
518531	1	0.0617,	0.0328,	0.0775,	0.0510,
518532	%	0.0627,	0.0324,	0.0785,	0.0512/
518533	C				
518534	END				


```

519000      BLOCK DATA BD19
519001      C
519002      C BLOCK DATA Subprogram 19: /OPMOD2/,/OPMOD3/
519003      C
519004      C BLOCK DATA 19 defines the last years of the model year groups used for
519005      C indexing BFRCOF and the mileage related parameters for the operating mode
519006      C component of the operating mode and temperature correction factor algorithm.
519007      C
519008      C Common block array subscripts:
519009      C
519010      C MYGBFR(8,3,6) - MYGBFR ( IG, IP, IVLM )
519011      C
519012      C Common block dictionary:
519013      C
519014      C   Name      Type      Description
519015      C   -----
519016      C /OPMOD2/:
519017      C
519018      C MYSTEP      I      flag = 2 if MY = 1981+ & IV = 1 = LDGV,
519019      C                        or if MY = 1984+ & IV = 2 = LDGT1,
519020      C                        or if MY = 1984+ & IV = 3 = LDGT2, = 1 otherwise
519021      C MAXBFR      R      maximum number of model year groups allowed for MYGBFR
519022      C MYGBFR      I      last year of model year groups for BFRCOF
519023      C
519024      C /OPMOD3/:
519025      C
519026      C BFMILE      R      cumulative mileage in ICY for IV from MY scaled by 10**4
519027      C KINKBF      I      flag: 1 = mileage 50,000 or less, 2 = mileage over 50,000
519028      C BFGT50      R      mileage greater than 50,000 (BFMILE=60,000 -> BFGT50=10,000)
519029      C
519030      C Local array subscripts:
519031      C
519032      C IBFYR1(8,3) - IBFYR1( IG, IP )
519033      C IBFYR2(8,3) - IBFYR2( IG, IP )
519034      C IBFYR3(8,3) - IBFYR3( IG, IP )
519035      C IBFYR5(8,3) - IBFYR5( IG, IP )
519036      C IBFYR6(8,3) - IBFYR6( IG, IP )
519037      C IBFYR8(8,3) - IBFYR8( IG, IP )
519038      C
519039      C Local array dictionary:
519040      C
519041      C   Name      Type      Description
519042      C   -----
519043      C IBFYR<IV> I      IV's BFRCOF myg upper bounds (ex: IBFYR8 = MC myg ub's),
519044      C                        equivalenced to the corresponding section of MYGBFR
519045      C
519046      C Notes:
519047      C
519048      C BD 19's data structure was renamed and compacted for MOBILE4.
519049      C
519050      C 1981+ LDGV and 1984+ LDGT1/2 myg index are
519051      C computed (my - 1981 + 1, 1992+ = 12) in IBFPTR.
519052      C
519053      C
519054      C      COMMON /OPMOD2/ MYSTEP,MAXBFR,MYGBFR(8,3,6)
519055      C      COMMON /OPMOD3/ BFMILE,KINKBF,BFGT50
519056      C
519057      C      DIMENSION

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519058      *   IBFYR1(8,3),
519059      *   IBFYR2(8,3),
519060      *   IBFYR3(8,3),
519061      *   IBFYR5(8,3),
519062      *   IBFYR6(8,3),
519063      *   IBFYR8(8,3)
519064      C
519065      EQUIVALENCE
519066      *   (MYGBFR(1,1,1),IBFYR1(1,1)),
519067      *   (MYGBFR(1,1,2),IBFYR2(1,1)),
519068      *   (MYGBFR(1,1,3),IBFYR3(1,1)),
519069      *   (MYGBFR(1,1,4),IBFYR5(1,1)),
519070      *   (MYGBFR(1,1,5),IBFYR6(1,1)),
519071      *   (MYGBFR(1,1,6),IBFYR8(1,1))
519072      C
519073      C /OPMOD2/:
519074      C
519075      DATA MAXBFR/8/,MYSTEP/1/
519076      C
519077      C Last year of model year groups for normalized bag fractions. Continuation
519078      C code is IP.
519079      C
519080      DATA IBFYR1/
519081      H 1967,1969,1971,1974,1979,1980,2*0,
519082      C 1967,1969,1971,1974,1979,1980,2*0,
519083      N 1967,1972,1974,1976,1979,1980,2*0/
519084      C
519085      DATA IBFYR2/
519086      H 1967,1969,1971,1974,1978,1980,1983,0000,
519087      C 1967,1969,1971,1974,1978,1980,1983,0000,
519088      N 1967,1972,1974,1978,1980,1983,2*0/
519089      C
519090      DATA IBFYR3/
519091      H 1969,1973,1978,1980,1983,3*0,
519092      C 1969,1973,1978,1980,1983,3*0,
519093      N 1969,1973,1978,1980,1983,3*0/
519094      C
519095      DATA IBFYR5/
519096      H 1974,1976,1977,1978,1979,2020,2*0,
519097      C 1974,1976,1977,1978,1979,2020,2*0,
519098      N 1974,1976,1977,1978,1979,1980,1982,2020/
519099      C
519100      DATA IBFYR6/
519101      H 1978,1979,1982,2020,4*0,
519102      C 1978,1979,1982,2020,4*0,
519103      N 1978,1979,1984,2020,4*0/
519104      C
519105      DATA IBFYR8/
519106      H 1977,1979,2020,5*0,
519107      C 1977,1979,2020,5*0,
519108      N 1977,2020,6*0/
519109      C
519110      C /OPMOD3/:
519111      C
519112      DATA BFMILE/0.0/,KINKBF/1/,BFGT50/0.0/
519113      C
519114      END

```

```

520000      BLOCK DATA BD20
520001      C
520002      C BLOCK DATA Subprogram 20: /MYRSAV/,/VMXCOM/
520003      C
520004      C BLOCK DATA 20 initializes fleet characterization data:
520005      C (1) annual mileage accumulation rates by relative (to evaluation year)
520006      C model year (JDX) and vehicle type (IV)
520007      C (2) July 1 registration distributions, also by JDX and IV
520008      C (3) vehicle miles travelled (vmt) mix, by IV
520009      C (4) registration (reg) mix, by IV
520010      C
520011      C Common block array subscripts:
520012      C
520013      C AMAR(20,8) - AMAR ( JDX, IV )
520014      C JULMYR(20,8) - JULMYR ( JDX, IV )
520015      C REGMIX(8) - REGMIX ( IV )
520016      C TFNORM(8) - TFNORM ( IV )
520017      C VMTMIX(8) - VMTMIX ( IV )
520018      C
520019      C Common block dictionary:
520020      C
520021      C Name Type Description
520022      C -----
520023      C /MYRSAV/:
520024      C
520025      C NEWCUM I cumulative model year mileage recalculation flag
520026      C AMAR R annual mileage accumulation rates
520027      C JULMYR R July 1 registration distributions
520028      C
520029      C /VMXCOM/:
520030      C
520031      C REGMIX R normalized registration mix (registration percentage by IV)
520032      C TFNORM R for each IV, the sum across its 20 model year window of
520033      C registrations times mileage accrual rate
520034      C VMTMIX R normalized vehicle miles traveled mix (vmt percentage by IV)
520035      C
520036      C Local array subscripts:
520037      C
520038      C V12MAR(20,2) - V12MAR (JDX, IV )
520039      C V34MAR(20,2) - V34MAR (JDX, IV )
520040      C V56MAR(20,2) - V56MAR (JDX, IV )
520041      C V78MAR(20,2) - V78MAR (JDX, IV )
520042      C
520043      C Local array dictionary:
520044      C
520045      C Name Type Descriptions
520046      C -----
520047      C V12MAR R annual mileage accumulation rates for LDGVs and LDGTIs
520048      C V34MAR R annual mileage accumulation rates for LDGT2s and HDGVs
520049      C V56MAR R annual mileage accumulation rates for LDDVs and LDDTs
520050      C V78MAR R annual mileage accumulation rates for HDDVs and MCs
520051      C
520052      C Notes:
520053      C
520054      C The model year mileage recalculation flag "NEWCUM" is initialized here.
520055      C
520056      C HDDV MAR values are initialized as all zeros, since they are calculated by
520057      C subroutine HDDMAR or supplied by the user.

```

```

520058 C
520059 C AMAR and JULMYR were updated for MOBILE4.
520060 C
520061 REAL JULMYR
520062 C
520063 COMMON /MYRSV/ AMAR(20,8),JULMYR(20,8),NEWCUM
520064 COMMON /VMXCOM/ REGMIX(8),TFNORM(8),VMTMIX(8)
520065 C
520066 DIMENSION V12MAR(20,2),V34MAR(20,2),V56MAR(20,2),V78MAR(20,2)
520067 C
520068 EQUIVALENCE
520069 *(AMAR(1,1),V12MAR(1,1)),
520070 *(AMAR(1,3),V34MAR(1,1)),
520071 *(AMAR(1,5),V56MAR(1,1)),
520072 *(AMAR(1,7),V78MAR(1,1))
520073 C
520074 C Initialize NEWCUM.
520075 C
520076 DATA NEWCUM /1/
520077 C
520078 C Initialize REGMIX and TFNORM.
520079 C
520080 DATA REGMIX,TFNORM /16*0.0/
520081 C
520082 C The vmt mix below represents a typical distribution, but is NOT used during
520083 C execution, where the mix is either computed in TFCALX or supplied by user:
520084 C
520085 DATA VMTMIX/
520086 * .7824, .0825, .0468, .0419, .0021, .0004, .0354, .0085/
520087 C
520088 C Annual average mileage accumulation rates (divided by 100000)
520089 C
520090 DATA V12MAR/
520091 C LDGV
520092 *.13118, .12408, .11737, .11103, .10503,
520093 *.09935, .09398, .08889, .08409, .07954,
520094 *.07524, .07117, .06733, .06369, .06024,
520095 *.05698, .05390, .05099, .04823, .04562,
520096 C LDGT1
520097 *.15640, .14590, .13610, .12696, .11843,
520098 *.11048, .10306, .09614, .08968, .08366,
520099 *.07804, .07280, .06791, .06335, .05909,
520100 *.05512, .05142, .04797, .04475, .04174/
520101 DATA V34MAR/
520102 C LDGT2
520103 *.17608, .16217, .14937, .13758, .12671,
520104 *.11671, .10749, .09901, .09119, .08399,
520105 *.07736, .07125, .06562, .06044, .05567,
520106 *.05127, .04723, .04350, .04006, .03690,
520107 C HDGV
520108 *.18211, .16767, .15437, .14213, .13086,
520109 *.12048, .11093, .10213, .09403, .08657,
520110 *.07971, .07339, .06757, .06221, .05728,
520111 *.05273, .04855, .04470, .04116, .03789/
520112 DATA V56MAR/
520113 C LDDV
520114 *.17825, .16478, .15233, .14081, .13017,
520115 *.12033, .11124, .10283, .09506, .08788,

```



```

521000      BLOCK DATA BD21
521001      C
521002      C BLOCK DATA Subprogram 21: /ALUHAC/,/ALUHLT/
521003      C
521004      C BLOCK DATA 21 initializes the correction factors for air conditioning
521005      C usage (a/c or AC), extra load (XL), and trailer towing (TW).
521006      C
521007      C Common block array subscripts:
521008      C
521009      C ACEQIP(8,3,2) - ACEQIP ( IGEPTR, IVP, IR )
521010      C ACCF(2,3,2,3,2) - ACCF ( IAC, IP, IGLPTR, IVP, IR )
521011      C XLCF(3,6,3,2) - XLCF ( IP, IGLPTR, IVP, IR )
521012      C TWCF(3,6,3,2) - TWCF ( IP, IGLPTR, IVP, IR )
521013      C IAC = AC correction equation coefficient number (2 terms per equation)
521014      C
521015      C Common block dictionary:
521016      C
521017      C   Name      Type      Description
521018      C   -----
521019      C /ALUHAC/:
521020      C
521021      C ACEQIP  R      fractions of LDGV & LDGT1/2 vehicles equipped with a/c
521022      C ACCF    R      a/c correction factors
521023      C
521024      C /ALUHLT/:
521025      C
521026      C XLCF    R      extra load correction factors
521027      C TWCF    R      trailer towing correction factors
521028      C
521029      C Local array subscripts:
521030      C
521031      C TWCFLO(3,6,3) - TWCFLO ( IP, IGLPTR, IVP )
521032      C TWCFHI(3,6,3) - TWCFHI ( IP, IGLPTR, IVP )
521033      C XLCFLO(3,6,3) - XLCFLO ( IP, IGLPTR, IVP )
521034      C XLCFHI(3,6,3) - XLCFHI ( IP, IGLPTR, IVP )
521035      C
521036      C Local array dictionary:
521037      C
521038      C   Name      Type      Description
521039      C   -----
521040      C TWCFLO  R      trailer towing correction factors for low altitude region
521041      C TWCFHI  R      trailer towing correction factors for high altitude region
521042      C XLCFLO  R      extra load correction factors for low altitude region
521043      C XLCFHI  R      extra load correction factors for high altitude region
521044      C
521045      C
521046      C COMMON /ALUHAC/ ACEQIP(8,3,2),ACCF(2,3,2,3,2)
521047      C COMMON /ALUHLT/ XLCF(3,6,3,2),TWCF(3,6,3,2)
521048      C
521049      C DIMENSION TWCFLO(3,6,3),TWCFHI(3,6,3)
521050      C DIMENSION XLCFLO(3,6,3),XLCFHI(3,6,3)
521051      C
521052      C EQUIVALENCE
521053      C * (TWCF(1,1,1,1),TWCFLO(1,1,1)),
521054      C * (TWCF(1,1,1,2),TWCFHI(1,1,1)),
521055      C * (XLCF(1,1,1,1),XLCFLO(1,1,1)),
521056      C * (XLCF(1,1,1,2),XLCFHI(1,1,1))
521057      C

```

```

521058 C Fraction of vehicles equipped with a/c
521059 DATA ACEQIP/
521060 C Low altitude region
521061 * .07, .14, .24, .37, .51, .61, .72, 0.0,
521062 * .32, .52, .39, 0.0, 0.0, 0.0, 0.0, 0.0,
521063 * .32, .52, .39, 0.0, 0.0, 0.0, 0.0, 0.0,
521064 C High altitude region
521065 * .07, .14, .24, .37, .51, .61, .72, 0.0,
521066 * .32, .52, .39, 0.0, 0.0, 0.0, 0.0, 0.0,
521067 * .32, .52, .39, 0.0, 0.0, 0.0, 0.0, 0.0/
521068 C
521069 C A/c correction factors
521070 DATA ACCF/
521071 C Low altitude region
521072 * 1.0230E+0, 0.3344E-2, 1.2020E+0, 0.1808E-2, 1.2990E+0, 0.5643E-4,
521073 * 1.0000E+0, 0.3512E-2, 1.1300E+0, 0.1528E-2, 1.2210E+0, 0.4262E-3,
521074 * 1.0230E+0, 0.3344E-2, 1.2020E+0, 0.1808E-2, 1.2990E+0, 0.5643E-4,
521075 * 1.0000E+0, 0.3512E-2, 1.1300E+0, 0.1528E-2, 1.2210E+0, 0.4262E-3,
521076 * 1.0230E+0, 0.3344E-2, 1.2020E+0, 0.1808E-2, 1.2990E+0, 0.5643E-4,
521077 * 1.0000E+0, 0.3512E-2, 1.1300E+0, 0.1528E-2, 1.2210E+0, 0.4262E-3,
521078 C High altitude region
521079 * 1.0230E+0, 0.3344E-2, 1.2020E+0, 0.1808E-2, 1.2990E+0, 0.5643E-4,
521080 * 1.0000E+0, 0.3512E-2, 1.1300E+0, 0.1528E-2, 1.2210E+0, 0.4262E-3,
521081 * 1.0230E+0, 0.3344E-2, 1.2020E+0, 0.1808E-2, 1.2990E+0, 0.5643E-4,
521082 * 1.0000E+0, 0.3512E-2, 1.1300E+0, 0.1528E-2, 1.2210E+0, 0.4262E-3,
521083 * 1.0230E+0, 0.3344E-2, 1.2020E+0, 0.1808E-2, 1.2990E+0, 0.5643E-4,
521084 * 1.0000E+0, 0.3512E-2, 1.1300E+0, 0.1528E-2, 1.2210E+0, 0.4262E-3/
521085 C
521086 C Extra load correction factors
521087 C HC CO NOX
521088 C Low altitude region
521089 DATA XLCFLO/
521090 C LDGV
521091 * 1.0786, 1.2765, 0.9535,
521092 * 1.0495, 1.1384, 1.0313,
521093 * 1.0852, 1.2478, 1.0313,
521094 * 1.0556, 1.1347, 1.0313,
521095 * 1.0556, 1.1347, 1.0753,
521096 * 1.0455, 1.3058, 1.0719,
521097 C LDGT1
521098 * 1.0786, 1.2765, 0.9535,
521099 * 1.0495, 1.1384, 1.0313,
521100 * 1.0852, 1.2478, 1.0313,
521101 * 1.0556, 1.1347, 1.0313,
521102 * 1.0556, 1.1347, 1.0753,
521103 * 1.0455, 1.3058, 1.0719,
521104 C LDGT2
521105 * 1.0786, 1.2765, 0.9535,
521106 * 1.0495, 1.1384, 1.0313,
521107 * 1.0556, 1.1347, 1.0753,
521108 * 1.0455, 1.3058, 1.0719,
521109 * 0.0000, 0.0000, 0.0000,
521110 * 0.0000, 0.0000, 0.0000/
521111 C
521112 C High altitude region
521113 DATA XLCFHI/
521114 C LDGV
521115 * 1.0786, 1.2765, 0.9535,

```

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521116	*	1.0495, 1.1384, 1.0313,
521117	*	1.0852, 1.2478, 1.0313,
521118	*	1.0556, 1.1347, 1.0313,
521119	*	1.0556, 1.1347, 1.0753,
521120	*	1.0455, 1.3058, 1.0719,
521121	C LDGT1	
521122	*	1.0786, 1.2765, 0.9535,
521123	*	1.0495, 1.1384, 1.0313,
521124	*	1.0852, 1.2478, 1.0313,
521125	*	1.0556, 1.1347, 1.0313,
521126	*	1.0556, 1.1347, 1.0753,
521127	*	1.0455, 1.3058, 1.0719,
521128	C LDGT2	
521129	*	1.0786, 1.2765, 0.9535,
521130	*	1.0495, 1.1384, 1.0313,
521131	*	1.0556, 1.1347, 1.0753,
521132	*	1.0455, 1.3058, 1.0719,
521133	*	0.0000, 0.0000, 0.0000,
521134	*	0.0000, 0.0000, 0.0000/
521135	C	
521136	C	Trailer towing correction factors
521137	C	HC CO NOX
521138	C	Low altitude region
521139		DATA TWCFL0/
521140	C LDGV	
521141	*	1.2614, 1.9327, 1.1184,
521142	*	1.2762, 1.8940, 1.1384,
521143	*	1.4598, 2.4753, 1.1384,
521144	*	1.7288, 2.1414, 1.1384,
521145	*	1.7288, 2.1414, 1.2170,
521146	*	1.5909, 3.9722, 1.3875,
521147	C LDGT1	
521148	*	1.2614, 1.9327, 1.1184,
521149	*	1.2762, 1.8940, 1.1384,
521150	*	1.4598, 2.4753, 1.1384,
521151	*	1.7288, 2.1414, 1.1384,
521152	*	1.7288, 2.1414, 1.2170,
521153	*	1.5909, 3.9722, 1.3875,
521154	C LDGT2	
521155	*	1.2614, 1.9327, 1.1184,
521156	*	1.2762, 1.8940, 1.1384,
521157	*	1.7288, 2.1414, 1.2170,
521158	*	1.5909, 3.9722, 1.3875,
521159	*	0.0000, 0.0000, 0.0000,
521160	*	0.0000, 0.0000, 0.0000/
521161	C	
521162	C	High altitude region
521163		DATA TWCFH1/
521164	C LDGV	
521165	*	1.2614, 1.9327, 1.1184,
521166	*	1.2762, 1.8940, 1.1384,
521167	*	1.4598, 2.4753, 1.1384,
521168	*	1.7288, 2.1414, 1.1384,
521169	*	1.7288, 2.1414, 1.2170,
521170	*	1.5909, 3.9722, 1.3875,
521171	C LDGT1	
521172	*	1.2614, 1.9327, 1.1184,
521173	*	1.2762, 1.8940, 1.1384,

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521174	*	1.4598, 2.4753, 1.1384,
521175	*	1.7288, 2.1414, 1.1384,
521176	*	1.7288, 2.1414, 1.2170,
521177	*	1.5909, 3.9722, 1.3875,
521178	C LDGT2	
521179	*	1.2614, 1.9327, 1.1184,
521180	*	1.2762, 1.8940, 1.1384,
521181	*	1.7288, 2.1414, 1.2170,
521182	*	1.5909, 3.9722, 1.3875,
521183	*	0.0000, 0.0000, 0.0000,
521184	*	0.0000, 0.0000, 0.0000/
521185	C	
521186	END	

```

522000      BLOCK DATA BD22
522001      C
522002      C BLOCK DATA Subprogram 22: /ALUPAC/,/ALUPLT/
522003      C
522004      C BLOCK DATA 22 defines the last years of the model year groups used for
522005      C the a/c, XL, & TW correction factors.
522006      C
522007      C Common block array subscripts:
522008      C
522009      C MYGACE(8,3,2) - MYGACE ( IG, IVP, IR )
522010      C MYGACC(2,3,2) - MYGACC ( IG, IVP, IR )
522011      C MYGXLC(6,3,2) - MYGXLC ( IG, IVP, IR )
522012      C MYGTWC(6,3,2) - MYGTWC ( IG, IVP, IR )
522013      C
522014      C Common block dictionary:
522015      C
522016      C      Name      Type      Description
522017      C      -----
522018      C /ALUPAC/:
522019      C
522020      C MYGACE      I      the last year of the model year groups for ACEQIP
522021      C                      (fraction of vehicles equipped with a/c)
522022      C MYGACC      I      the last year of the model year groups for ACCF
522023      C                      (a/c correction factors)
522024      C
522025      C /ALUPLT/:
522026      C
522027      C MYGXLC      I      the last year of the model year groups for XLCF
522028      C                      (extra load correction factors)
522029      C MYGTWC      I      the last year of the model year groups for TWCF
522030      C                      (trailer towing correction factors)
522031      C
522032      C
522033      C      COMMON /ALUPAC/ MYGACE(8,3,2),MYGACC(2,3,2)
522034      C      COMMON /ALUPLT/ MYGXLC(6,3,2),MYGTWC(6,3,2)
522035      C
522036      C      DATA MYGACE/
522037      C Low altitude region
522038      C      * 1961,1964,1966,1968,1971,1976,2020,0000,
522039      C      * 1976,1977,2020,0000,0000,0000,0000,0000,
522040      C      * 1976,1977,2020,0000,0000,0000,0000,0000,
522041      C High altitude region
522042      C      * 1961,1964,1966,1968,1971,1976,2020,0000,
522043      C      * 1976,1977,2020,0000,0000,0000,0000,0000,
522044      C      * 1976,1977,2020,0000,0000,0000,0000,0000/
522045      C
522046      C      DATA MYGACC/
522047      C Low altitude region
522048      C      * 1974,2020,
522049      C      * 1974,2020,
522050      C      * 1978,2020,
522051      C High altitude region
522052      C      * 1974,2020,
522053      C      * 1974,2020,
522054      C      * 1978,2020/
522055      C
522056      C      DATA MYGXLC/
522057      C Low altitude region

```


Appendix C: MOBILE4 Block Data 22

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522058 * 1967, 1969, 1971, 1972, 1974, 2020,
522059 * 1967, 1969, 1971, 1972, 1974, 2020,
522060 * 1969, 1973, 1978, 2020, 0000, 0000,
522061 C High altitude region
522062 * 1967, 1969, 1971, 1972, 1974, 2020,
522063 * 1967, 1969, 1971, 1972, 1974, 2020,
522064 * 1969, 1973, 1978, 2020, 0000, 0000/
522065 C
522066 DATA MYGTWC/
522067 C Low altitude region
522068 * 1967, 1969, 1971, 1972, 1974, 2020,
522069 * 1967, 1969, 1971, 1972, 1974, 2020,
522070 * 1969, 1973, 1978, 2020, 0000, 0000,
522071 C High altitude region
522072 * 1967, 1969, 1971, 1972, 1974, 2020,
522073 * 1967, 1969, 1971, 1972, 1974, 2020,
522074 * 1969, 1973, 1978, 2020, 0000, 0000/
522075 C
522076 END

```

523000      BLOCK DATA BD23
523001      C
523002      C BLOCK DATA Subprogram 23: /GSFCOM/
523003      C
523004      C BLOCK DATA 23 initializes the gasoline vs diesel sales fractions.
523005      C
523006      C Common block array subscripts:
523007      C
523008      C GSFRAC(22,8,2) - GSFRAC ( IGSFPT, IV, IR )
523009      C MYGSF(22,8,2) - MYGSF ( IG, IV, IR )
523010      C
523011      C Common block dictionary:
523012      C
523013      C   Name      Type      Description
523014      C   -----
523015      C /GSFCOM/:
523016      C
523017      C MAXGSF   I      maximum number of sales fractions for any IR & IV case
523018      C GSFRAC   I      gasoline vs diesel sales fractions
523019      C MYGSF    I      gasoline vs diesel sales fraction model year groups
523020      C
523021      C Local array subscripts:
523022      C
523023      C GSFL0(22,8) - GSFL0 ( IGSFPT, IV)
523024      C GSFHI(22,8) - GSFHI ( IGSFPT, IV)
523025      C IGSFL0(22,8) - IGSFL0 ( IG, IV )
523026      C IGSFHI(22,8) - IGSFHI ( IG, IV )
523027      C
523028      C Local array dictionary:
523029      C
523030      C   Name      Type      Description
523031      C   -----
523032      C GSFL0     R      low altitude region sales fractions
523033      C GSFHI     R      high altitude region sales fractions
523034      C IGSFL0    I      last year of sales fraction model year groups
523035      C                      for low altitude regions
523036      C IGSFHI    I      last year of sales fraction model year groups
523037      C                      for high altitude regions
523038      C
523039      C Notes:
523040      C
523041      C GSFRAC and MYGSF were updated for MOBILE4.
523042      C
523043      C
523044      C COMMON /GSFCOM/ MAXGSF,GSFRAC(22,8,2),MYGSF(22,8,2)
523045      C
523046      C DIMENSION
523047      C * GSFL0(22,8),
523048      C * GSFHI(22,8),
523049      C * IGSFL0(22,8),
523050      C * IGSFHI(22,8)
523051      C
523052      C EQUIVALENCE
523053      C * (GSFRAC(1,1,1),GSFL0(1,1)),
523054      C * (GSFRAC(1,1,2),GSFHI(1,1)),
523055      C * (MYGSF(1,1,1),IGSFL0(1,1)),
523056      C * (MYGSF(1,1,2),IGSFHI(1,1))
523057      C

```

Appendix C: MOBILE4 Block Data 23

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[illegible]

523116	C	Last year of light duty (or motorcycle) model year groups
523117	C	
523118	C	Low altitude region
523119		DATA IGSFLO/
523120	C	LDGV
523121	*	1970, 1971, 1973, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984,
523122	*	1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 2020,
523123	C	LDGT1
523124	*	1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987,
523125	*	1988, 1989, 1990, 1991, 1992, 1993, 1994, 2020, 0000, 0000, 0000,
523126	C	LDGT2
523127	*	1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987,
523128	*	1988, 1989, 1990, 1991, 1992, 1993, 1994, 2020, 0000, 0000, 0000,
523129	C	HDTV
523130	*	2020, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000,
523131	*	0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000,
523132	C	LDV
523133	*	1970, 1971, 1973, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984,
523134	*	1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 2020,
523135	C	LDDT
523136	*	1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987,
523137	*	1988, 1989, 1990, 1991, 1992, 1993, 1994, 2020, 0000, 0000, 0000,
523138	C	HDDV
523139	*	2020, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000,
523140	*	0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000,
523141	C	MC
523142	*	2020, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000,
523143	*	0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000/
523144	C	
523145	C	High altitude region
523146		DATA IGSFHI/
523147	C	LDGV
523148	*	1970, 1971, 1973, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984,
523149	*	1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 2020,
523150	C	LDGT1
523151	*	1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987,
523152	*	1988, 1989, 1990, 1991, 1992, 1993, 1994, 2020, 0000, 0000, 0000,
523153	C	LDGT2
523154	*	1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987,
523155	*	1988, 1989, 1990, 1991, 1992, 1993, 1994, 2020, 0000, 0000, 0000,
523156	C	HDTV
523157	*	2020, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000,
523158	*	0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000,
523159	C	LDV
523160	*	1970, 1971, 1973, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984,
523161	*	1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 2020,
523162	C	LDDT
523163	*	1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987,
523164	*	1988, 1989, 1990, 1991, 1992, 1993, 1994, 2020, 0000, 0000, 0000,
523165	C	HDDV
523166	*	2020, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000,
523167	*	0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000,
523168	C	MC
523169	*	2020, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000,
523170	*	0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000/
523171	C	
523172		END

Appendix C: MOBILE4 Block Data 24

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```

524000      BLOCK DATA BD24
524001      C
524002      C BLOCK DATA Subprogram 24: /NAME$1/,/NAME$2/,/STRING/,/USDATA/
524003      C
524004      C BLOCK DATA 24 initializes character strings used in prompts & output formats
524005      C and zeroes pointers into character string arrays.
524006      C
524007      C Common block array subscripts:
524008      C
524009      C NAMETH(2)      - NAMETH ( IETH )
524010      C NAMFLG(16)   - NAMFLG ( IFG )
524011      C NAMMMR(2,2,8) - NAMMMR ( ICH, IG, IV )
524012      C NAMRVP(4)   - NAMRVP ( IRVP )
524013      C NAMTEM(2)    - NAMTEM ( ITEM )
524014      C NOYES(2)     - NOYES ( <ILDT,INO,IMFLAG,ATPFLG> )
524015      C USNAME(4,4)  - USNAME ( ICH, IUSD )
524016      C IUSD(4)     - IUSD ( ICT )
524017      C
524018      C Common block dictionary:
524019      C
524020      C      Name      Type      Description
524021      C      -----
524022      C /NAME$1/:
524023      C
524024      C NAMFLG      C*8      control flag names for prompts and error messages
524025      C NAMMMR      C*8      prompts for replacement AMAR & JULMYR, by JDX & IV
524026      C NAMRVP      C*4      name of RVP falling outside allowable range
524027      C
524028      C /NAME$2/:
524029      C
524030      C NAMETH      C*4      'eth' & 'meth' prefixes for (m)ethanol range error messages
524031      C NAMTEM      C*4      'mini' & 'maxi' prefixes for fuel tank temp error messages
524032      C
524033      C /STRING/:
524034      C
524035      C NOYES        C*4      character string for no/yes
524036      C COMMA        C*4      character string for comma
524037      C PERIOD        C*4      character string for period
524038      C COLON         C*1      character string for colon
524039      C
524040      C /USDATA/:
524041      C
524042      C IUSD          I        pointers to the names of user supplied one-time data for run
524043      C NUSD          I        number of names of user supplied one-time data for this run
524044      C USNAME        R        names of one-time data supplied by user
524045      C
524046      C Notes:
524047      C
524048      C BD 24 was modified for MOBILE4, adding /NAME$2/.
524049      C BD 24 was modified for MOBILE4, removing TPDFLG and adding TEMFLG
524050      C
524051      C
524052      C CHARACTER*8 NAMFLG,NAMMMR
524053      C CHARACTER*8 USNAME
524054      C CHARACTER*4 NAMRVP,NAMETH,NAMTEM
524055      C CHARACTER*4 NOYES,COMMA,PERIOD
524056      C CHARACTER*1 COLON
524057      C

```



```

524058      COMMON /NAMES1/ NAMFLG(16),NAMMMR(2,2,8),NAMRVP(4)
524059      COMMON /NAMES2/ NAMETH(2),NAMTEM(2)
524060      COMMON /STRING/ NOYES(2),COMMA,PERIOD,COLON
524061      COMMON /USDATA/ USNAME(4,4),NUSD,IUSD(4)
524062      C
524063      C /NAMES1/: These names are used in input routines and in QUITER.
524064      C
524065      DATA NAMFLG/
524066      *          ' TAMFLG ',
524067      *          ' SPDFLG ',
524068      *          ' VMFLAG ',
524069      *          ' MYMRFG ',
524070      *          ' NEWFLG ',
524071      *          ' IMFLAG ',
524072      *          ' ALHFLG ',
524073      *          ' ATPFLG ',
524074      *          ' RLFLAG ',
524075      *          ' LOCFLG ',
524076      *          ' TEMFLG ',
524077      *          ' OUTFMT ',
524078      *          ' PRTFLG ',
524079      *          ' IDLFLG ',
524080      *          ' NMHFLG ',
524081      *          ' HCFLAG '/
524082      C
524083      DATA NAMMMR/
524084      *          '1-10 for',' LDGV: ',
524085      *          '11-20 fo','r LDGV: ',
524086      *          '1-10 for',' LDGT1: ',
524087      *          '11-20 fo','r LDGT1:',
524088      *          '1-10 for',' LDGT2: ',
524089      *          '11-20 fo','r LDGT2:',
524090      *          '1-10 for',' HDGV: ',
524091      *          '11-20 fo','r HDGV: ',
524092      *          '1-10 for',' LDDV: ',
524093      *          '11-20 fo','r LDDV: ',
524094      *          '1-10 for',' LDDT: ',
524095      *          '11-20 fo','r LDDT: ',
524096      *          '1-10 for',' HDDV: ',
524097      *          '11-20 fo','r HDDV: ',
524098      *          '1-10 for',' MC: ',
524099      *          '11-20 fo','r MC: '/
524100      C
524101      DATA NAMRVP /'Base','luse','Ref1','Wthr'/
524102      C
524103      C /NAMES2/: These names are used in QUITER error messages.
524104      C
524105      DATA NAMETH/' eth','meth'/,NAMTEM/'mini','maxi'/
524106      C
524107      C /STRING/:
524108      C
524109      DATA NOYES/'No ', 'Yes '/
524110      DATA COMMA/',' ', PERIOD/',' ', COLON/':' '/
524111      C
524112      C /USDATA/:
524113      C
524114      DATA USNAME/' tamperi','ng and m','isfuelin','g rates ',
524115      *          ' basic ','exhaust ','emission','s rates ',

```

Appendix C: MOBILE4 Block Data 24

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524116	*	' mileag', 'e accrual', 'l distri', 'butions '
524117	*	' veh reg', 'istratio', 'n distri', 'butions '/
524118	C	
524119		DATA NUSD, IUSD/5*0/
524120	C	
524121		END

```

525000      BLOCK DATA BD25
525001      C
525002      C BLOCK DATA Subprogram 25: /ATPAR1/,/ATPAR2/,/ATPAR3/,/ATPAR4/,/EGSCAL/,
525003      C /EMECAL/,/EVDPAT/,/LOOKUP/,/MYCODE/,/MYUB1/,
525004      C /MYUB2/,/OMTCOM/,/SIZCAL/,/SIZPAR/,/TAMEQ1/,
525005      C /TAMEQ2/,/TAMEQ3/,/TAMID1/,/TAMID2/,/TAMID3/
525006      C /TAMOUT/,/TAMOU2/
525007      C
525008      C BLOCK DATA 25 defines and initializes the common blocks created by the
525009      C tampering code.
525010      C
525011      C Common block array subscripts:
525012      C
525013      C AER(11,11,2,2) - AER ( IC11, IC11, IPG, IAY )
525014      C AIR(2) - AIR ( IAY )
525015      C ATR(5,2) - ATR ( IDBAG , IAY )
525016      C BTR(9,2) - BTR ( ID, IAY )
525017      C CAN(2) - CAN ( IAY )
525018      C CAP(2) - CAP ( IAY )
525019      C CAT(2) - CAT ( IAY )
525020      C CCEMI(7,4) - CCEMI ( IG4, IVTAM )
525021      C CSAE(12) - CSAE ( IC )
525022      C CSIZE(12,2) - CSIZE ( IC , IAY )
525023      C DISTYP(8) - DISTYP ( IDUSER ) (see ID defn in (1,999) )
525024      C EFF(2,3,15) - EGR ( ATPPGM, ICOL , IROW )
525025      C EGR(2) - EGR ( IAY )
525026      C EGS(7,2) - EGS ( IEG, IPG )
525027      C EMEGR(4,3,3) - EMEGR ( IG2, IB, IP )
525028      C EMI(7,3,3) - EMI ( IEG, IB, IP )
525029      C EMIDL(3,4,3) - EMIDL ( IGTIDL, IEG, IP )
525030      C EMIOX(3,3,3) - EMIOX ( IGTIDL, IEK, IP )
525031      C EMI3W(3,3,3) - EMI3W ( IGTIDL, IEK, IP )
525032      C EMOX(3,3,3) - EMOX ( IEK, IB, IP )
525033      C EM3W(3,3,3) - EM3W ( IEK, IB, IP )
525034      C EVPAER(2,2) - EVPAER ( IHG, IAY )
525035      C EVPTGS(3,2,4) - EVPTGS ( IG3, IHG, IVTAM )
525036      C GCONLY(20,4) - TOB ( IDX, IVTAM )
525037      C INDXCS(5,4) - INDXCS ( NT, IS )
525038      C LVTFLG(4) - LVTFLG ( IVTAM )
525039      C MYCCEI(7,4) - MYCCEI ( IG4, IVTAM )
525040      C MYEGR(4,4) - MYEGR ( IG2, IVTAM )
525041      C MYGTAM(4) - MYGTAM ( IVTAM )
525042      C MYIDLE(3,3) - MYIDLE ( IG , IEK )
525043      C MYTGS(11,6,4) - MYTGS ( IG1, IQG, IVTAM )
525044      C MYVTS(3,2,4) - MYVTS ( IG3, IHG, IVTAM )
525045      C ECK(2) - ECK ( NCKIAY )
525046      C NTERMS(4) - NTERMS ( IS )
525047      C OFFIDL(3,20,4) - OFFIDL ( IP, IDX, IVTAM )
525048      C OMTCF(20,3,8) - OMTCF ( IDX, IP, IV )
525049      C OMTTAM(20,3,4) - OMTTAM ( IDX, IP, IVTAM )
525050      C OPENLP(20,4) - OPENLP ( IDX, IVTAM )
525051      C PCV(2) - PCV ( IAY )
525052      C TAMBAG(3,3,20,4) - TAMBAG ( IB, IP, IDX, IVTAM )
525053      C TAMDR(9,4,3,2) - TAMDR ( ID, IVTAM, IGD, IM )
525054      C TAMZML(9,4,2,2) - TAMZML ( ID, IVTAM, IGD, IM )
525055      C TCC(20,4) - TCC ( IDX, IVTAM )
525056      C TDU(20,4) - TDU ( IDX, IVTAM )
525057      C TGS(11,6,4) - TGS ( IG1, IQG, IVTAM )

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525058 C THS(2,20,4)      - THS      ( IFDS, IDX, IVTAM )
525059 C TNK(2)            - TNK      ( IAY )
525060 C TOB(20,4)         - TOB      ( IDX, IVTAM )
525061 C
525062 C Common block dictionary:
525063 C
525064 C   Name      Type      Description
525065 C   -----
525066 C /ATPAR1/:
525067 C
525068 C ATPFLG = 2 => user enters EVPAER, AER & all of this block:
525069 C
525070 C LAPSY      I      ATP start year
525071 C LAPIST     I      1st (oldest) model year of the ATP
525072 C LAPLST     I      last (youngest) model year of the ATP
525073 C LVTFLG     I      which vehicle types covered by the anti-tampering program.
525074 C                for each of the 4 (LDGV, LDGT1, LDGT2, HDGV) flags:
525075 C                1 = not covered
525076 C                2 = covered
525077 C                all "1"s = same result as ATPFLG = 1 = no program - the ATP
525078 C                effectiveness matrices are not applied.
525079 C
525080 C
525081 C /ATPAR2/:
525082 C
525083 C ATPFLG = 2 => user enters all of this block:
525084 C
525085 C ATPPGM     I      ATP inspection program type: value must be either
525086 C                1 (centralized) or 2 (decentralized)
525087 C ATPFQT     I      ATP inspection program frequency: value must be either
525088 C                1 (annual) or 2 (biennial)
525089 C CRATP      R      compliance rate for anti-tampering program, value must
525090 C                be from 0 to 100%, inclusive
525091 C DISTYP     I      flag indicating which ATP inspection type is conducted:
525092 C                value must be either 1 (no) or 2 (yes):
525093 C
525094 C                DISTYP(1) = Air pump system disablement
525095 C                DISTYP(2) = Catalyst removal
525096 C                DISTYP(3) = Fuel inlet restrictor disablement (Requiring
525097 C                        catalyst replacement)
525098 C                DISTYP(4) = Tailpipe lead deposit test (Requiring
525099 C                        catalyst replacement)
525100 C                DISTYP(5) = EGR disablement
525101 C                DISTYP(6) = Evaporative system disablement
525102 C                DISTYP(7) = PCV system disablement
525103 C                DISTYP(8) = Missing gas cap
525104 C
525105 C /EGSCAL/:
525106 C
525107 C AER        R      anti-tampering program effectiveness rates: ATPFLG = 2
525108 C                11 X 11 matrix 1 - previous (up thru LAPSY), HC/CO
525109 C                11 X 11 matrix 2 - previous, NOX
525110 C                11 X 11 matrix 3 - subsequent (after LAPSY), HC/CO
525111 C                11 X 11 matrix 4 - subsequent, NOX
525112 C                row IC of each 11 X 11 is multiplied times vector CSIZE to
525113 C                get CSAE(IC).
525114 C TGS        R      technology (pollution control equipment) group size
525115 C EGS        R      tampering effects group size

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525116 C OPENLP R percentage equipped with open loop control technology
525117 C
525118 C /EMECAL/:
525119 C
525120 C EM3W R emission impact rates for 3-way catalysts
525121 C EMOX R emission impact rates for oxidation catalysts
525122 C EMEGR R emission offsets for EGR failure
525123 C EMI R emission impact offset assuming 100% tampering rate
525124 C
525125 C /EVPDAT/:
525126 C
525127 C EVPAER R evap/PCV ATP effectiveness rates: ATPFLG = 2 => user supplies
525128 C one 2 X 2 matrix using 4F5.2 format:
525129 C (1,1) - previous evap (1,2) - subsequent evap
525130 C (2,1) - previous CC (2,2) - subsequent CC
525131 C EVPTGS R evap/PCV technology group sizes
525132 C CCEMI R PCV ("CC") emission impact rates
525133 C
525134 C Abbreviations -
525135 C ATP - Anti-Tampering Program
525136 C ATER - Anti-Tampering Effectiveness Rate
525137 C PREV - PREVIOUS to the start of an ATP (IAY case = 1)
525138 C SUBS - SUBSequent to the start of an ATP (IAY case = 2)
525139 C fP&S - for PREV and SUBS cases
525140 C
525141 C /ATPAR3/:
525142 C
525143 C AIR R ATER for air pump disablement fP&S
525144 C CAT R ATER for catalyst removal fP&S
525145 C ECK R ATER for fuel neck/inlet disablement for PREV CAT (NCKIAY = 1)
525146 C PREV (NCKIAY = 2), and SUBS (NCKIAY = 3)
525147 C TNK R ATER for tank/tailpipe lead deposit tests fP&S
525148 C EGR R ATER for EGR disablement fP&S
525149 C
525150 C /ATPAR4/:
525151 C
525152 C CAN R ATER for evap canister disablement fP&S
525153 C PCV R ATER for PCV disablement fP&S
525154 C CAP R ATER for missing gas cap fP&S
525155 C EFF R array containing basic ATERs, as follows:
525156 C
525157 C ATPPGM: (1) (2) (1) (2) (1) (2) (1=CENTRALIZED 2=DECENTRALIZED)
525158 C PREVIOUS SUBSEQUENT
525159 C CAT PREVIOUS
525160 C REMOVED -----
525161 C ID=1
525162 C
525163 C ATPFQT=1 --- --- .80 .40 .80 .80 AIR PUMP INSP. ANNUAL
525164 C ATPFQT=2 --- --- .70 .35 .70 .70 BIENNIAL
525165 C
525166 C ID=2
525167 C
525168 C ----- --- .95 .48 .95 .95 CATALYST INSP.
525169 C
525170 C ID=3
525171 C
525172 C DISTYP(2)=1 .00 .00 .00 .00 .00 .00 FUEL INLET INSP. W/O CAT INSP
525173 C

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525174 C DISTYP(2)=2 .59 .30 .33 .17 .70 .70 FUEL INLET INSP. WITH I/M.
525175 C & IMFLAG =2
525176 C & DISTYP(4)=1
525177 C
525178 C DISTYP(2)=2 .33 .17 .17 .08 .30 .30 FUEL INLET INSP. W/O I/M
525179 C & IMFLAG =1
525180 C & DISTYP(4)=1
525181 C
525182 C DISTYP(2)=2 .75 .38 .75 .38 .85 .85 WITH PLUMBTESMO CHECK
525183 C & DISTYP(4)=2
525184 C
525185 C ID=4
525186 C
525187 C DISTYP(2)=1 --- --- .00 .00 .00 .00 PLUMBTESMO CHECK WITH CAT INSP
525188 C DISTYP(2)=2 --- --- .75 .38 .85 .85 W/O CAT INSP
525189 C
525190 C ID=5
525191 C
525192 C ----- --- --- .00 .00 .00 .00 EGR INSP
525193 C
525194 C ID=6
525195 C
525196 C ATPFQT=1 --- --- .70 .35 .70 .35 EVAP SYS INSP ANNUAL
525197 C ATPFQT=2 --- --- .57 .29 .57 .29 BIENNIAL
525198 C
525199 C ID=7
525200 C
525201 C ATPFQT=1 --- --- .70 .35 .70 .35 PCV SYS INSP ANNUAL
525202 C ATPFQT=2 --- --- .56 .28 .56 .28 BIENNIAL
525203 C
525204 C ID=8
525205 C
525206 C ----- --- --- .50 .50 .50 .50 GAS CAP INSP
525207 C
525208 C
525209 C /LOOKUP/:
525210 C
525211 C IVTAM, IQG, IPG, JPGD, IHG & IGCSF are defined in the subscript dictionary.
525212 C
525213 C /MYCODE/:
525214 C
525215 C MY I model year being evaluated on current IDX loop pass
525216 C LDXSY I pointer: anti-tampering program start year's location in the
525217 C calendar year's 20 model year window; JDX ordering
525218 C LMYRVT I flag: 1 = IDX not in ATP my range &/or vt not covered by ATP
525219 C 2 = IDX is in ATP my range & vt is covered by ATP
525220 C IMDXSY I pointer: inspection / maintenance program start year's
525221 C location in the calendar year's 20 model year window;
525222 C JDX ordering
525223 C IMKINK I flag: 1 = tampering rate curves straight;
525224 C 2 = tampering rate curves have I/M kink
525225 C IDX, JDX and IAY are defined in the subscript dictionary.
525226 C
525227 C
525228 C /MYUB1/:
525229 C
525230 C MYTGS I model year range upper bound years for ITAMPT indexing TGS
525231 C MYEGR I model year range upper bound years for ITAMPT indexing EMEGR

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525232	C	MYVTS	I	model year range upper bound years for ITAMPT indexing EVPTGS
525233	C			
525234	C	/MYUB2/:		
525235	C			
525236	C	MYCCEI	I	model year range upper bound years for ITAMPT indexing CCEMI
525237	C			
525238	C	/OMTCOM/:		
525239	C			
525240	C	OMTCF	R	operating mode & temperature correction factor to the
525241	C			composite emission factor. Calculated in BIGCFX. Passed to
525242	C			function BEF to be multiplied times the CEF.
525243	C	OMTTAM	R	operating mode and temperature corrected tampering effect on
525244	C			bag emissions. Calculated in BIGCFX. Passed to BEF to be
525245	C			added to the (corrected for OMTCF & I/M) CEF.
525246	C			
525247	C	/SIZCAL/:		
525248	C			
525249	C	ATR	R	exhaust ef BTRs adjusted for equipment type & size
525250	C	TGSUSE	R	technology group size from TGS used on EFFGRP IQG loop pass.
525251	C	CSIZE	R	effects category size
525252	C	CSAE	R	CSIZE modified by AER
525253	C			
525254	C	/SIZPAR/:		
525255	C			
525256	C	NTERMS	I	number of overlap category sizes to be subtracted from
525257	C			ATR(IS,IAY) to obtain CSIZE(IS+7,IAY).
525258	C	INDXCS	I	pointer to the category sizes to be subtracted from
525259	C			ATR(IS,IAY) to obtain CSIZE(IS+7,IAY)
525260	C			
525261	C	/TAMEQ1/:		
525262	C			
525263	C	TAMZML	R	basic tampering rate equation's zero mile level (intercept)
525264	C	TAMDR	R	basic tampering rate equation's deterioration rate (slope)
525265	C	MYGTAM	R	ub of 1st myg (of 2) for each tampering rate vehicle class
525266	C	IGT5	I	myg location of DRs for "greater than 50,000 miles" interval
525267	C	F50K	R	50,000 miles vmt, scaled by division by 10**4 (= 5.0)
525268	C			in BEF = the LDGV 81+ HC/CO curves deflection point
525269	C			in DISCAL = the IVTAM IGD IP curves deflection point
525270	C			
525271	C	TAMFLG = 2 =>		user replaces all of TAMZML & TAMDR with values read in by
525272	C			ONESEC (1-time Data Section).
525273	C			
525274	C	/TAMEQ2/:		
525275	C			
525276	C	BTR	R	base tampering rate for standalone disablement cases
525277	C			
525278	C	/TAMEQ3/:		
525279	C			
525280	C	CUMALL	R	mileage accumulated segments for straight line subcases
525281	C			(no kink from I/M startup):
525282	C			(1) MY through ICY for DISATP cases 1, 2 & 3:
525283	C			all "previous", all "subsequent", overall p+s mileage
525284	C			(2) MY through LAPSY for DISATP case 3: "previous" mileage
525285	C			
525286	C			Kinked rate lines mileage accumulated sections:
525287	C			
525288	C	CUMNIM	R	from MY through ICYIM
525289	C	CUMIM	R	after ICYIM through last year in segment (ICY or LAPSY)

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525290 C GT50KA R mileage in excess of 50,000 on the CUMALL segment
525291 C GT50KN R mileage in excess of 50,000 on the CUMNIM segment
525292 C GT50KI R mileage in excess of 50,000 on the CUMNIM+CUMIM segments,
525293 C except if CUMNIM GE 50,000, GT50KI = CUMIM
525294 C
525295 C /TAMID1/:
525296 C
525297 C EM13W R idle emission impact rates for 3-way catalyst tampering
525298 C EM10X R idle emission impact rates for oxidation catalyst tampering
525299 C EMIDL R idle emission impact offset assuming 100% tampering rate
525300 C
525301 C /TAMID2/:
525302 C
525303 C MYIDLE R idle tampering impact model year groups
525304 C IEK R catalyst type tampering effects group index
525305 C
525306 C /TAMID3/:
525307 C
525308 C OFFIDL R idle tampering offset
525309 C
525310 C /TAMOUT/:
525311 C
525312 C TAMBAG R tampering effects on the exhaust bag data. Calculated in
525313 C subroutine TAMPER. Passed to BIGCFX to get OMTTAM.
525314 C THS R percentage of given IV & MY subject to tampered HS loss
525315 C TDU R percentage of given IV & MY subject to tampered DU loss
525316 C TCC R tampered CC offset = affected fleet %age * tampered CC loss
525317 C
525318 C /TAMOU2/:
525319 C
525320 C TOB R Probability (Evap Cannister is tampered | IVTAM is EC equipped)
525321 C for each IDX x IVTAM case. Unlike THS & TDU, TOB is not wgtd
525322 C by PCTEQP = the Probability (IVTAM is EC equipped), because it
525323 C is used to figure the tampering impact on OnBoard Evaporative
525324 C Cannisters, where it is assumed that if OB is in effect in a MY
525325 C then 100% of the vehicle types covered are OB EC equipped.
525326 C
525327 C TDU R percentage of given IV & MY subject to tampered gas caps
525328 C Local array subscripts:
525329 C
525330 C MYTGSH(11,6) - MYTGSH ( IG1, IQG )
525331 C MYTGSL(11,6,3) - MYTGSL ( IG1, IQG, IVTAM )
525332 C TDRIM(9,4,3) - TDRIM ( ID, IVTAM, IGD )
525333 C TDRNON(9,4,3) - TDRNON ( ID, IVTAM, IGD )
525334 C TGSHDV(11,6) - TGSHDV ( IG1, IQG )
525335 C TGSLDV(11,6,3) - TGSLDV ( IG1, IQG, IVTAM )
525336 C
525337 C Local array dictionary:
525338 C
525339 C Name Type Description
525340 C -----
525341 C MYTGSH I my range ub years for HDGV for ITAMPT indexing TGS
525342 C MYTGSL I my range ub years for LDGV/T1/T2 for ITAMPT indexing TGS
525343 C TDRIM R TAMDRs for the I/M case
525344 C TDRNON R TAMDRs for the Non-I/M case
525345 C TGSHDV R technology group sizes for HDGV
525346 C TGSLDV R technology group sizes for LDGV/T1/T2
525347 C

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525348 C Notes:
525349 C
525350 C The following common blocks defined and used elsewhere in MOBILE4 contain
525351 C data used by the tampering effects section:
525352 C
525353 C /CUMCOM/: CUMMIL - cumulative mileage array (JDX,IV)
525354 C /FLAGS2/: IMFLAG - I/M program flag
525355 C /IMPAR1/: ICYIM - I/M program start year
525356 C          MODYR1 - first model year covered by I/M program
525357 C          MODYR2 - last model year covered by I/M program
525358 C          ILDT - vehicle types covered by I/M program
525359 C
525360 C See the block data sections for these commons for more information on their
525361 C variables / arrays.
525362 C
525363 C FORTRAN limits the number of continuation lines to 19. Use equivalenced
525364 C local arrays to initialize common block arrays if this limit will be
525365 C exceeded otherwise. This is true throughout all the block datas.
525366 C
525367 C MOBILE4 added code to include fuel injected/carbureted tampering
525368 C rates. Also added new tampering factor (cap + evp). 'ID' was
525369 C increased to 8.
525370 C
525371 C MOBILE4 replaced EVPEM1, MYVE1, IH and TAMEVP with CCEM1, MYCCE1, THS,
525372 C TDU and TCC, in support of the Evaporative Study II change requirements.
525373 C
525374 C BD 25 was modified in MOBILE4 to add the IGD dimension to TAMZML & TAMDR.
525375 C BD 25 was modified for MOBILE4 to add > 50K case to IGD (IGD = 3).
525376 C BD 25 was modified for MOBILE4 for AER/EVPAER internal generation.
525377 C BD 25 was modified for MOBILE4 for the new misfueling algorithm and the
525378 C new tampering intercepts and slopes (TAMZML & TAMDR).
525379 C BD 25 was modified for MOBILE4 for new EM13W, EM10X, EM1DL, and
525380 C MYIDLE values and to add /TAMOU2/.
525381 C
525382 C
525383 C      INTEGER ATPPGM,ATPFQT,DISTYP
525384 C
525385 C      COMMON /ATPAR1/ LAPSY,LAP1ST,LAPLST,LVTFLG(4)
525386 C      COMMON /ATPAR2/ ATPPGM,ATPFQT,CRATP,DISTYP(8)
525387 C      COMMON /ATPAR3/ AIR(2),CAT(2),ECK(3),TNK(2),EGR(2)
525388 C      COMMON /ATPAR4/ CAN(2),PCV(2),CAP(2),EFF(2,3,15)
525389 C      COMMON /EGSCAL/ AER(11,11,2,2),TGS(11,6,4),EGS(7,2),OPENLP(20,4)
525390 C      COMMON /EMECAL/ EM3W(3,3,3),EMOX(3,3,3),EMEGR(4,3,3),EMI(7,3,3)
525391 C      COMMON /EVPDAT/ EVPAER(3,2),EVPTGS(3,2,4),CCEM1(7,4)
525392 C      COMMON /LOOKUP/ IVTAM,IQG,IPG,JPGD,IHG,IGCSF
525393 C      COMMON /MYCODE/ MY,IDX,JDX,LDSY,LMYRVT,IAY,IMDXY,IMKINK
525394 C      COMMON /MYUB1/ MYTGS(11,6,4),MYEGR(4,4),MYVTS(3,2,4)
525395 C      COMMON /MYUB2/ MYCCE1(7,4)
525396 C      COMMON /OMTCOM/ OMTCF(20,3,8),OMTTAM(20,3,4)
525397 C      COMMON /SIZCAL/ ATR(5,2),TGSUSE,CSIZE(12,2),CSAE(12)
525398 C      COMMON /SIZPAR/ NTERMS(4),INDXCS(5,4)
525399 C      COMMON /TAMEQ1/ TAMZML(9,4,2,2),TAMDR(9,4,3,2),MYGTAM(4),IGT5,F50K
525400 C      COMMON /TAMEQ2/ BTR(9,2)
525401 C      COMMON /TAMEQ3/ CUMALL,CUMNIM,CUMIM,GT50KA,GT50KN,GT50KI
525402 C      COMMON /TAMID1/ EM13W(3,3,3),EM10X(3,3,3),EM1DL(3,4,3)
525403 C      COMMON /TAMID2/ MYIDLE(3,3),IEK
525404 C      COMMON /TAMID3/ OFFIDL(3,20,4)
525405 C      COMMON /TAMOUT/ TAMBAG(3,3,20,4),THS(2,20,4),TDU(20,4),TCC(20,4)

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525406      COMMON /TAMOU2/ TOB(20,4),GCONLY(20,4)
525407      C
525408      DIMENSION MYTGSL(11,6,3),MYTGSH(11,6)
525409      DIMENSION TGS LDV(11,6,3),TGSHDV(11,6)
525410      DIMENSION TDRNON(9,4,3),TDRIM(9,4,3)
525411      C
525412      EQUIVALENCE (MYTGS(1,1,1),MYTGSL(1,1,1))
525413      EQUIVALENCE (MYTGS(1,1,4),MYTGSH(1,1))
525414      EQUIVALENCE (TGS(1,1,1),TGS LDV(1,1,1))
525415      EQUIVALENCE (TAMDR(1,1,1,1),TDRNON(1,1,1))
525416      EQUIVALENCE (TAMDR(1,1,1,2),TDRIM(1,1,1))
525417      EQUIVALENCE (TGS(1,1,4),TGSHDV(1,1))
525418      C
525419      C /ATPAR1/: values can be replaced by user entered values.
525420      C
525421      DATA LAPSY,LAP1ST,LAPLST/3*2020/,LVTFLG/4*1/
525422      C
525423      C /ATPAR2/: values can be replaced by user entered values.
525424      C
525425      DATA ATPPGM,ATPFQT,DISTYP/10*1/,CRATP/100./
525426      C
525427      C /ATPAR3/:
525428      C
525429      DATA AIR,CAT,ECK,TNK,EGR/11*0./
525430      C
525431      C /ATPAR4/:
525432      C
525433      DATA CAN,PCV,CAP/6*0./
525434      C
525435      C Array EFF: continuation line code corresponds to ID:
525436      C
525437      DATA EFF/
525438      1      .00,.00, .80,.40, .80,.80,
525439      1      .00,.00, .70,.35, .70,.70,
525440      2      .00,.00, .95,.48, .95,.95,
525441      3      .00,.00, .00,.00, .00,.00,
525442      3      .59,.30, .33,.17, .70,.70,
525443      3      .33,.17, .17,.08, .30,.30,
525444      3      .75,.38, .75,.38, .85,.85,
525445      4      .00,.00, .00,.00, .00,.00,
525446      4      .00,.00, .75,.38, .85,.85,
525447      5      .00,.00, .00,.00, .00,.00,
525448      6      .00,.00, .70,.35, .70,.35,
525449      6      .00,.00, .57,.29, .57,.29,
525450      7      .00,.00, .70,.35, .70,.35,
525451      7      .00,.00, .56,.28, .56,.28,
525452      8      .00,.00, .50,.25, .50,.25/
525453      C
525454      C /EGSCAL/: TGS never changes, EGS and OPENLP are always computed
525455      C      during execution.
525456      C
525457      C AER is initialized to 4 11 X 11 matrices with 1.'s down the major diagonal
525458      C and 0.'s for all other cells. The continuation line code is:
525459      C 1 = previous (before ATP start year), HC/CO
525460      C 2 = previous, NOX
525461      C 3 = subsequent (at or after ATP start year), HC/CO
525462      C 4 = subsequent, NOX
525463      C

```



```

525464 DATA AER/
525465 1 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0.,
525466 1 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0., 1.,
525467 2 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0.,
525468 2 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0., 1.,
525469 3 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0.,
525470 3 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0., 1.,
525471 4 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0.,
525472 4 1.,11*0., 1.,11*0., 1.,11*0., 1.,11*0., 1./
525473 C
525474 C TGS has up to 10 percentages for each vehicle type / technology
525475 C combination. The remaining cells are dummied out with zeroes.
525476 C For each IVTAM, the continuation line technology code is:
525477 C 1 = air pump only
525478 C 2 = air pump / catalyst
525479 C 3 = catalyst only
525480 C 4 = EGR only
525481 C 5 = EGR / 3-way catalyst
525482 C 6 = no EGR / 3-way catalyst
525483 C
525484 DATA TGSLODV/
525485 C LDGV
525486 1 .00, .05, .10, .30, .15, .10, .05, .00, .00, .00, .00,
525487 2 .00, .30, .20, .25, .65, .75, .70, .60, .40, .30, .00,
525488 3 .00, .50, .55, .65, .30, .25, .30, .40, .60, .70, .00,
525489 4 .00, .80, .90, .05, .00, .00, .00, .00, .00, .00, .00,
525490 5 .00, .07, .85, .93, .90, .00, .00, .00, .00, .00, .00,
525491 6 .00, .01, .03, .07, .10, .00, .00, .00, .00, .00, .00,
525492 C LDGT1
525493 1 .00, .05, .10, .30, .10, .00, .00, .00, .00, .00, .00,
525494 2 .00, .30, .20, .40, .50, .60, .75, .55, .50, .00, .00,
525495 3 .00, .40, .50, .55, .40, .50, .40, .25, .45, .50, .00,
525496 4 .00, .80, .90, 1.00, .95, .90, .80, .70, .60, .50, .05,
525497 5 .00, .05, .10, .20, .30, .40, .50, .95, .00, .00, .00,
525498 6 .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00,
525499 C LDGT2
525500 1 .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00,
525501 2 .00, .50, .60, .75, .55, .50, .00, .00, .00, .00, .00,
525502 3 .00, .50, .40, .25, .45, .50, .00, .00, .00, .00, .00,
525503 4 .00, .30, 1.00, .90, .70, .60, .50, .15, .00, .00, .00,
525504 5 .00, .10, .30, .40, .50, .85, .00, .00, .00, .00, .00,
525505 6 .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00/
525506 C HDGV
525507 DATA TGSHDV/
525508 1 .00, .07, .00, .00, .00, .00, .00, .00, .00, .00, .00,
525509 2 .00, .30, .00, .00, .00, .00, .00, .00, .00, .00, .00,
525510 3 .00, .05, .00, .10, .25, .00, .00, .00, .00, .00, .00,
525511 4 .00, .95, 1.00, .85, .75, .00, .00, .00, .00, .00, .00,
525512 5 .00, .15, .25, .00, .00, .00, .00, .00, .00, .00, .00,
525513 6 .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00/
525514 C
525515 DATA EGS/14*0.0/,OPENLP/80*0.0/
525516 C
525517 C /EMECAL/: EM3W, EMOX, EMEGR and EMI(1/6/7,1B,1P) never change.
525518 C EMI(2-5,1B,1P) values are computed during execution.
525519 C
525520 C Each of the 4 arrays is ordered 1st by pollutant and then by bag.
525521 C The continuation line code is thus:

```

525522 C H = HC
 525523 C C = CO
 525524 C N = NOX
 525525 C
 525526 C Within each line the values are blocked by bag 1,2,3 in that order.
 525527 C Within each block the values are ordered by disablement effects group
 525528 C for EM3W, EMOX AND EMI or by model year group for EMEGR.
 525529 C
 525530 C

	Bag 1			Bag 2			Bag 3		
	AirP	CatR	Misf	AirP	CatR	Misf	AirP	CatR	Misf
525531 C	----	----	----	----	----	----	----	----	----
525532 C	DATA EM3W/								
525533	H	1.36, 1.80,	1.42,	0.765,	2.25,	1.56,	0.611,	1.81,	1.21,
525534	C	31.796, 16.32,	8.08,	18.207,	14.11,	6.60,	18.25,	11.07,	5.37,
525535	N	0.00, 1.49,	0.64,	0.00,	1.36,	0.45,	0.00,	1.83,	0.74/
525536									
525537 C	DATA EMOX/								
525538	H	1.80, 2.31,	2.30,	1.37,	3.40,	2.57,	1.04,	2.95,	2.40,
525539	C	34.67, 41.40,	46.50,	33.90,	28.97,	13.13,	21.28,	16.06,	16.62,
525540	N	0.00, 0.00,	0.00,	0.00,	0.00,	0.00,	0.00,	0.00,	0.00/
525541									
525542 C	Column headings above only apply to EM3W and EMOX.								
525543 C									
525544 C	DATA EMEGR/								
525545	H	4*0.00,	4*0.00,	4*0.00,					
525546	C	4*0.00,	4*0.00,	4*0.00,					
525547	N	1.40, 3.82,	4.11,	1.36,	0.96,	2.63,	2.68,	1.19,	1.54, 4.21, 4.53, 1.21/
525548									
525549 C	DATA EMI/								
525550	H	1.80, 6*0.00,		1.37, 6*0.00,		1.04, 6*0.00,			
525551	C	34.67, 6*0.00,		33.90, 6*0.00,		21.28, 6*0.00,			
525552	N	5*0.00, 3.02,	2.12,	5*0.00, 3.46,	1.85,	5*0.00, 3.55,	2.16/		
525553									
525554 C	/EVPDAT/: EVPTGS and CCEMI never change. The user will be allowed to								
525555 C	replace the EVPAER rates with values from the One-time Data								
525556 C	section.								
525557 C									
525558 C	All the evap and PCV effectiveness rates start at the neutral value, 1.								
525559 C									
525560 C	DATA EVPAER/6*1./								
525561									
525562 C	EVPTGS continuation line code is:								
525563 C	1 = LDGV								
525564 C	2 = LDGT1								
525565 C	3 = LDGT2								
525566 C	4 = HDGV								
525567 C	Each line is divided into evap and PCV blocks. Each block is filled with								
525568 C	model year group values and dummy zeroes.								
525569 C									
525570 C	DATA EVPTGS/								
525571	1	.00, 1.00,	.00,	.00,	.00,	1.00,			
525572	2	.00, 1.00,	.00,	.00,	.00,	1.00,			
525573	3	.00, .05,	1.00,	.00,	1.00,	.00,			
525574	4	.00, 1.00,	.00,	.00,	1.00,	.00/			
525575									
525576 C	The CCEMI continuation code is IVTAM (= EVPTGS code above).								
525577 C									
525578 C	DATA CCEMI/								
525579									

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525580 1 0.00, 1.28, 1.27, 1.26, 1.24, 1.22, 1.21,
 525581 2 0.00, 1.28, 1.27, 1.24, 1.23, 0.00, 0.00,
 525582 3 0.00, 1.28, 1.27, 1.24, 1.23, 0.00, 0.00,
 525583 4 0.00, 1.34, 1.29, 0.00, 0.00, 0.00, 0.00/
 525584 C
 525585 C /LOOKUP/ & /MYCODE/ are all indices computed during execution.
 525586 C
 525587 DATA IVTAM,IQG,IPG,JPGD,IHG,IGCSF/6*1/
 525588 DATA MY,IDX,JDX,LDSY,LMYRVT,IAY,IMDXY,IMKINK/2020,7*1/
 525589 C
 525590 C /MYUB/: the model year upper bound pointers never change.
 525591 C
 525592 C MYTGS continuation line code corresponds to the IQG code:
 525593 C 1 = air pump only
 525594 C 2 = air pump / catalyst
 525595 C 3 = catalyst only
 525596 C 4 = EGR only
 525597 C 5 = EGR / 3-way catalyst
 525598 C 6 = no EGR / 3-way catalyst
 525599 C
 525600 DATA MYTGSL/
 525601 C LDGV
 525602 1 1967,1971,1972,1974,1975,1977,1979,2020,0000,0000,0000,
 525603 2 1974,1976,1977,1979,1980,1981,1982,1985,1986,2020,0000,
 525604 3 1974,1975,1976,1979,1980,1981,1982,1985,1986,2020,0000,
 525605 4 1972,1973,1980,1983,2020,0000,0000,0000,0000,0000,0000,
 525606 5 1979,1980,1983,1986,2020,0000,0000,0000,0000,0000,0000,
 525607 6 1981,1982,1983,1986,2020,0000,0000,0000,0000,0000,0000,
 525608 C LDGT1
 525609 1 1967,1971,1972,1974,1980,2020,0000,0000,0000,0000,0000,
 525610 2 1974,1976,1978,1980,1981,1983,1985,1987,2020,0000,0000,
 525611 3 1974,1975,1976,1978,1980,1981,1983,1985,1987,2020,0000,
 525612 4 1972,1973,1978,1980,1981,1982,1983,1984,1985,1986,2020,
 525613 5 1980,1981,1982,1983,1984,1985,1986,2020,0000,0000,0000,
 525614 6 2020,0000,0000,0000,0000,0000,0000,0000,0000,0000,
 525615 C LDGT2
 525616 1 2020,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
 525617 2 1978,1981,1983,1985,1987,2020,0000,0000,0000,0000,0000,
 525618 3 1978,1981,1983,1985,1987,2020,0000,0000,0000,0000,0000,
 525619 4 1972,1978,1982,1983,1984,1985,1986,2020,0000,0000,0000,
 525620 5 1982,1983,1984,1985,1986,2020,0000,0000,0000,0000,0000,
 525621 6 2020,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000/
 525622 C HDGV
 525623 DATA MYTGSH/
 525624 1 1986,2020,0000,0000,0000,0000,0000,0000,0000,0000,0000,
 525625 2 1986,2020,0000,0000,0000,0000,0000,0000,0000,0000,0000,
 525626 3 1981,1986,1987,1989,2020,0000,0000,0000,0000,0000,0000,
 525627 4 1984,1985,1986,1989,2020,0000,0000,0000,0000,0000,0000,
 525628 5 1986,1989,2020,0000,0000,0000,0000,0000,0000,0000,0000,
 525629 6 2020,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000/
 525630 C
 525631 C MYEGR keys only on vehicle type, even though EMEGR varies with pollutant
 525632 C and bag number. Also, cell 2 for LDGT2 is a dummy, since there is no
 525633 C NOX 3.1 standard my range for LDGT2. Otherwise, the 4 ranges for each
 525634 C IVTAM correspond to the no standard, 3.1, 2.0 and 1.0 cases.
 525635 C The continuation line code is the IVTAM code:
 525636 C 1 = LDGV
 525637 C 2 = LDGT1

```

525638 C 3 = LDGT2
525639 C 4 = HDGV
525640 C
525641 DATA MYEGR/
525642 1 1974,1976,1980,2020,
525643 2 1974,1978,1987,2020,
525644 3 1978,1978,1987,2020,
525645 4 1989,2020,0000,0000/
525646 C
525647 C MYVTS continuation line code is also the IVTAM code. Each line is
525648 C divided into the evap and PCV blocks.
525649 C
525650 DATA MYVTS/
525651 1 1970,2020,0000, 1962,1967,2020,
525652 2 1970,2020,0000, 1962,1967,2020,
525653 3 1970,1978,2020, 1967,2020,0000,
525654 4 1984,2020,0000, 1967,2020,0000/
525655 C
525656 C MYCCEI continuation code is IVTAM (= EVPTGS code above).
525657 C
525658 DATA MYCCEI/
525659 1 1963,1970,1974,1977,1979,1980,2020,
525660 2 1963,1977,1979,1980,2020,0000,0000,
525661 3 1963,1977,1979,1980,2020,0000,0000,
525662 4 1963,1980,2020,4*0/
525663 C
525664 C /OMTCF/: all values are computed during execution by BIGCFX.
525665 C
525666 DATA OMTCF/480*1.0/,OMTTAM/240*0.0/
525667 C
525668 C /SIZCAL/: values are all computed during execution.
525669 C
525670 DATA ATR,TGSUSE,CSIZE,CSAE/47*0.0/
525671 C
525672 C /SIZPAR/: values never change.
525673 C
525674 DATA NTERMS/5,5,3,3/
525675 DATA INDXCS/1,2,3,4,5,1,4,5,6,7,2,4,6,0,0,3,5,7,0,0/
525676 C
525677 C /TAMEQ1/: TAMZML and TAMDR have hardcoded values that can be replaced with
525678 C user supplied values in the One-time Data input section.
525679 C
525680 C Observe IGD's definition differs between its use in TAMZML versus in TAMDR:
525681 C
525682 C MYG Arrays IVTAM MY Range VMT Range
525683 C ---
525684 C 1 Both LDGV/T 1941 - 1980 ---
525685 C HDGV 1981 - 2020 ---
525686 C 2 TAMZML LDGV/T 1981 - 2020 ---
525687 C HDGV >2020 ---
525688 C TAMDR LDGV/T 1981 - 2020 <= 50,000
525689 C >2020 <= 50,000
525690 C 3 TAMDR LDGV/T 1981 - 2020 > 50,000
525691 C >2020 > 50,000
525692 C
525693 C Continuation line code for TAMZML and TAMDR is IVTAM.
525694 C
525695 C Each line contains the 9 disablement intercepts (TAMZML) and deterioration

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525696 C rates (TAMDR) for the given vehicle type, myg and I/M case.
525697 C
525698 DATA TAMZML/
525699 C AIRS CATS NCKS TNKS EGRS EVAP PCVS CAPS MISF
525700 C Non-I/M & MYG 1
525701 1 -.0556, .0362, .0183, .0109, .0673, -.0206, -.0059, -.0186, .0292,
525702 2 .2155, .2267, .1462, -.0375, .1037, -.0185, -.0022, -.0121, .1087,
525703 3 .2155, .2267, .1462, -.0375, .1037, -.0185, -.0022, -.0121, .1087,
525704 4 .2155, .2267, .1462, -.0375, .1037, -.0185, -.0022, -.0121, .1087,
525705 C Non-I/M & MYG 2
525706 1 -.0157, -.0071, -.0068, .0140, -.0054, -.0206, -.0059, -.0186, .0072,
525707 2 -.0274, -.0100, .0087, .0231, -.0139, -.0185, -.0022, -.0121, .0318,
525708 3 -.0274, -.0100, .0087, .0231, -.0139, -.0185, -.0022, -.0121, .0318,
525709 4 -.0274, -.0100, .0087, .0231, -.0139, -.0185, -.0022, -.0121, .0318,
525710 C I/M & MYG 1
525711 1 -.0473, -.0062, .0163, .0434, .0206, -.0063, -.0024, -.0077, .0597,
525712 2 .2015, -.0081, .0437, -.0705, .0880, -.0186, -.0068, -.0213, -.0268,
525713 3 .2015, -.0081, .0437, -.0705, .0880, -.0186, -.0068, -.0213, -.0268,
525714 4 .2015, -.0081, .0437, -.0705, .0880, -.0186, -.0068, -.0213, -.0268,
525715 C I/M & MYG 2
525716 1 -.0106, -.0058, -.0002, .0115, .0002, -.0063, -.0024, -.0077, .0113,
525717 2 -.0044, .0085, .0059, .0097, .0068, -.0186, -.0068, -.0213, .0156,
525718 3 -.0044, .0085, .0059, .0097, .0068, -.0186, -.0068, -.0213, .0156,
525719 4 -.0044, .0085, .0059, .0097, .0068, -.0186, -.0068, -.0213, .0156/
525720 C
525721 DATA TDRNON/
525722 C AIRS CATS NCKS TNKS EGRS EVAP PCVS CAPS MISF
525723 C Non-I/M & MYG 1
525724 1 .03819, .01546, .02393, .00171, .01552, .01154, .00315, .01301, .02564,
525725 2 .02630, .02260, .03684, .00857, .02175, .01801, .00419, .01832, .04541,
525726 3 .02630, .02260, .03684, .00857, .02175, .01801, .00419, .01832, .04541,
525727 4 .02630, .02260, .03684, .00857, .02175, .01801, .00419, .01832, .04541,
525728 C Non-I/M & MYG 2 & vmt <= 50K
525729 1 .00961, .00574, .00496, .00101, .00674, .01154, .00315, .01301, .00597,
525730 2 .02619, .02074, .00926, -.00212, .01374, .01801, .00419, .01832, .00714,
525731 3 .02619, .02074, .00926, -.00212, .01374, .01801, .00419, .01832, .00714,
525732 4 .02619, .02074, .00926, -.00212, .01374, .01801, .00419, .01832, .00714,
525733 C Non-I/M & MYG 2 & vmt > 50K (release M4 will use MYG 1 rates as >50K dr's)
525734 1 .03819, .01546, .02393, .00171, .01552, .01154, .00315, .01301, .02564,
525735 2 .02630, .02260, .03684, .00857, .02175, .01801, .00419, .01832, .04541,
525736 3 .02630, .02260, .03684, .00857, .02175, .01801, .00419, .01832, .04541,
525737 4 .02630, .02260, .03684, .00857, .02175, .01801, .00419, .01832, .04541/
525738 C
525739 DATA TDRIM/
525740 C AIRS CATS NCKS TNKS EGRS EVAP PCVS CAPS MISF
525741 C I/M & MYG 1
525742 1 .02914, .00960, .01188, -.00216, .01449, .00601, .00180, .00752, .00972,
525743 2 .01561, .03342, .02806, .01076, .01078, .01349, .00315, .01484, .03882,
525744 3 .01561, .03342, .02806, .01076, .01078, .01349, .00315, .01484, .03882,
525745 4 .01561, .03342, .02806, .01076, .01078, .01349, .00315, .01484, .03882,
525746 C I/M & MYG 2 & vmt <= 50K
525747 1 .00744, .00338, .00059, .00009, .00286, .00601, .00180, .00752, .00068,
525748 2 .00874, .00618, .00380, .00554, .00370, .01349, .00315, .01484, .00934,
525749 3 .00874, .00618, .00380, .00554, .00370, .01349, .00315, .01484, .00934,
525750 4 .00874, .00618, .00380, .00554, .00370, .01349, .00315, .01484, .00934,
525751 C I/M & MYG 2 & vmt > 50K
525752 1 .02914, .00960, .01188, -.00216, .01449, .00601, .00180, .00752, .00972,
525753 2 .01561, .03342, .02806, .01076, .01078, .01349, .00315, .01484, .03882,

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525754      3 .01561,.03342,.02806, .01076,.01078,.01349,.00315,.01484,.03882,
525755      4 .01561,.03342,.02806, .01076,.01078,.01349,.00315,.01484,.03882/
525756      C
525757      DATA MYGTAM/1980,1980,1980,2020/,1GT5/3/,F50K/5.0/
525758      C
525759      C /TAMEQ2/: contains BTR, whose rates are calculated during execution.
525760      C /TAMEQ3/: contains the cumulative mileage segments calculated in DISIMP.
525761      C
525762      DATA BTR/18*0./,CUMALL,CUMNIM,CUMIM,GT50KA,GT50KN,GT50KI/6*0.0/
525763      C
525764      C /TAMID1/: EM13W and EM10X never change. EMIDL values are calculated
525765      C during execution.
525766      C
525767      C The continuation code for all 3 arrays is 1P. The disablement effects groups
525768      C are indicated for EM13W and EM10X.
525769      C
525770      C
525771      C
525772      C
525773      C
525774      C
525775      C
525776      C
525777      C
525778      C
525779      C
525780      C
525781      C
525782      C
525783      C
525784      C
525785      C
525786      C
525787      C
525788      C
525789      C
525790      C
525791      C
525792      C
525793      C
525794      C
525795      C
525796      C
525797      C
525798      C
525799      C
525800      C
525801      C
525802      C
525803      C
525804      C
525805      C
525806      C
525807      C
525808      C
525809      C
525810      C

```

3 .01561,.03342,.02806, .01076,.01078,.01349,.00315,.01484,.03882,
4 .01561,.03342,.02806, .01076,.01078,.01349,.00315,.01484,.03882/

DATA MYGTAM/1980,1980,1980,2020/,1GT5/3/,F50K/5.0/

/TAMEQ2/: contains BTR, whose rates are calculated during execution.
/TAMEQ3/: contains the cumulative mileage segments calculated in DISIMP.

DATA BTR/18*0./,CUMALL,CUMNIM,CUMIM,GT50KA,GT50KN,GT50KI/6*0.0/

/TAMID1/: EM13W and EM10X never change. EMIDL values are calculated during execution.

The continuation code for all 3 arrays is 1P. The disablement effects groups are indicated for EM13W and EM10X.

	Air Pump	Catalyst Removed	Misfueling
DATA EM13W/			
H 0.00, 8.97, 11.71,	0.00, 42.83, 0.00,	0.00, 9.70, 0.00,	
C 0.00,177.43,215.29,	0.00,124.82, 0.00,	0.00, 14.18, 0.00,	
N 0.00, 0.00, 0.09,	0.00, 2.31, 0.00,	0.00, 0.13, 0.00/	
DATA EM10X/			
H 0.00, 27.38, 27.38,	0.00, 42.83, 0.00,	0.00, 9.70, 0.00,	
C 0.00,506.08,506.08,	0.00,124.82, 0.00,	0.00, 14.18, 0.00,	
N 0.00, 0.00, 0.00,	0.00, 0.00, 0.00,	0.00, 0.00, 0.00/	
DATA EMIDL/			
H 3*0., 3*0., 3*0., 3*0.,			
C 3*0., 3*0., 3*0., 3*0.,			
N 3*0., 3*0., 3*0., 3*0./			

/TAMID2/: contains model year group upper bound pointers and catalyst effects groups. The continuation code = 1EK.

DATA MYIDLE/
1 1967, 1985, 2020,
2 1974, 2020, 0000,
3 1974, 2020, 0000/

DATA 1EK/1/

/TAMID3/: all values are computed during execution - OFFIDL by BAGEME

DATA OFFIDL/240*0.00/

/TAMOUT/: all values are computed during execution - TAMBAG by BAGEME and THS, TDU & TCC by EVPEME.

DATA TAMBAG/720*0.0/,THS,TDU,TCC/320*0.0/

/TAMOU2/: all values are computed during execution by EVPEME.

DATA TOB,GCONLY/160*0.0/

END

Appendix C: MOBILE4 Block Data 26

May 5, 1989

```

526000      BLOCK DATA BD26
526001      C
526002      C BLOCK DATA Subprogram 26: /HDDMAR/,/HDDREG/
526003      C
526004      C BLOCK DATA 26 initializes the HDDV fleet characterization data by weight
526005      C subclass (C2B,L,M,H array name prefixes) & by relative model yr (JDX & KDX):
526006      C (1) annual mileage accumulation rates
526007      C (2) total new registrations
526008      C
526009      C Common block array subscripts:
526010      C
526011      C C2BDVM(20) - C2BDVM ( JDX )
526012      C LHDVM(20) - LHDVM ( JDX )
526013      C MHDVM(20) - MHDVM ( JDX )
526014      C HHDVM(20) - HHDVM ( JDX )
526015      C
526016      C C2BDRG(21) - C2BDRG ( KDX )
526017      C LHDRG(21) - LHDRG ( KDX )
526018      C MHDRG(21) - MHDRG ( KDX )
526019      C HHDRG(21) - HHDRG ( KDX )
526020      C KDX=1 for pre-1981, 2 for 1981, ... , 21 for 2000+.
526021      C
526022      C Common block dictionary:
526023      C
526024      C      Name      Type      Description
526025      C      -----
526026      C /HDDMAR/:
526027      C
526028      C C2BDVM      R      class 2b HDDV mileage accumulation rates
526029      C LHDVM      R      light HDDV mileage accumulation rates
526030      C MHDVM      R      medium HDDV mileage accumulation rates
526031      C HHDVM      R      heavy HDDV mileage accumulation rates
526032      C
526033      C /HDDREG/:
526034      C
526035      C C2BDRG      R      class 2b HDDV new registrations
526036      C LHDRG      R      light HDDV new registrations
526037      C MHDRG      R      medium HDDV new registrations
526038      C HHDRG      R      heavy HDDV new registrations
526039      C
526040      C Notes:
526041      C
526042      C All /HDDMAR/ & /HDDREG/ arrays were updated for MOBILE4.
526043      C ZML/TAMDR coefficients were updated for MOBILE4.
526044      C
526045      C
526046      C      REAL LHDVM,MHDVM,HHDVM,LHDRG,MHDRG,HHDRG
526047      C
526048      C      COMMON /HDDMAR/ C2BDVM(20),LHDVM(20),MHDVM(20),HHDVM(20)
526049      C      COMMON /HDDREG/ C2BDRG(21),LHDRG(21),MHDRG(21),HHDRG(21)
526050      C
526051      C /HDDMAR/:
526052      C
526053      C Annual average Class 2B truck mileage accumulation (divided by 100000)
526054      C
526055      C      DATA C2BDVM/
526056      C      * .17608, .16217, .14937, .13758, .12671,
526057      C      * .11671, .10749, .09901, .09119, .08399,

```

Appendix C: MOBILE4 Block Data 26

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```

526058      * .07736, .07125, .06562, .06044, .05567,
526059      * .05127, .04723, .04350, .04006, .03690/
526060      C
526061      C Annual average Light HDDV mileage accumulation (divided by 100000)
526062      C
526063      DATA LHDVM/
526064      * .23611, .20947, .18583, .16486, .14625,
526065      * .12975, .11511, .10212, .09059, .08037,
526066      * .07130, .06325, .05612, .04978, .04416,
526067      * .03918, .03476, .03084, .02736, .02427/
526068      C
526069      C Annual average medium HDDV mileage accumulation (divided by 100000)
526070      C
526071      DATA MHDVM/
526072      * .43946, .40504, .37332, .34408, .31713,
526073      * .29229, .26939, .24829, .22885, .21092,
526074      * .19440, .17918, .16514, .15221, .14029,
526075      * .12930, .11917, .10984, .10123, .09331/
526076      C
526077      C Annual average heavy HDDV mileage accumulation (divided by 100000)
526078      C
526079      DATA HHDVM/
526080      * .86375, .79434, .73051, .67181, .61782,
526081      * .56817, .52252, .48053, .44191, .40640,
526082      * .37374, .34371, .31609, .29069, .26733,
526083      * .24585, .22609, .20792, .19121, .17585/
526084      C
526085      C /HDDREG/:
526086      C
526087      C Annual Class 2B truck new registrations (1980- through 2000+)
526088      C
526089      DATA C2BDRG/
526090      * .001, .001, .047, .119, .200, .309, .397, .495, .599, .710,
526091      * .831, .956, 1.086, 1.214, 1.341, 1.464, 1.585, 1.702, 1.816, 1.925,
526092      * 2.030/
526093      C
526094      C Annual light HDDV new registrations (1980- through 2000+)
526095      C
526096      DATA LHDRG/
526097      * .003, .004, .009, .015, .024, .041, .057, .074, .091, .107,
526098      * .122, .136, .150, .164, .176, .188, .200, .211, .221, .232,
526099      * .241/
526100      C
526101      C Annual medium HDDV new registrations (1980- through 2000+)
526102      C
526103      DATA MHDRG/
526104      * .536, .570, .590, .609, .648, .711, .761, .811, .858, .902,
526105      * .944, .988, 1.033, 1.079, 1.127, 1.175, 1.225, 1.277, 1.328, 1.379,
526106      * 1.430/
526107      C
526108      C Annual heavy HDDV new registrations (1980- through 2000+)
526109      C
526110      DATA HHDRG/
526111      * .990, 1.033, 1.049, 1.067, 1.129, 1.189, 1.228, 1.260, 1.287, 1.308,
526112      * 1.324, 1.340, 1.356, 1.372, 1.387, 1.406, 1.425, 1.447, 1.470, 1.495,
526113      * 1.522/
526114      C
526115      END

```

Appendix C: MOBILE4 Block Data 27

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527000

BLOCK DATA BD27

527001

C

527002

C

527003

C

527004

C

527005

C

527006

C

527007

C

527008

C

527009

C

527010

C

527011

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527012

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527013

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527014

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527015

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527016

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527017

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527018

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527019

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527020

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527021

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527022

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527023

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527024

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527025

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527026

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527027

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527028

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527029

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527030

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527031

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527032

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527033

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527034

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527035

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527036

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527037

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527038

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527039

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527040

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527041

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527042

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527043

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527044

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527045

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527046

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527047

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527048

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527049

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527050

C

527051

C

527052

C

527053

C

527054

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527055

C

527056

C

527057

C

BLOCK DATA Subprogram 27: /ALUHIN/,/ALUOUT/,/BASEQ3/,/CEVCOM/,/CEVBMV/,
/CUMCOM/,/FLAGS1/,/FLAGS2/,/FLAGS3/,/FLAGS4/,
/IMPAR1/,/IMPAR2/,/MYRCAL/,/OFFSET/,/PROJEC/,
/REGISF/,/RESUL1/,/RESUL2/,/RESUL3/

BLOCK DATA 27's common blocks did not need to be initialized, so were
assigned dummy zeroes, to facilitate debugging, to prevent control statement
failure when compiled under a FORTRAN that does not employ the left to right
rule, etc.

Common block array subscripts:

ALHRET (20,4,3) - ALHRET (JDX, IG, IP)
BMYMPD (20,8) - BMYMPD (IG, IV)
BMYTPD (20,8) - BMYTPD (IG, IV)
CUMMIL (20,8) - CUMMIL (JDX, IV)
EFEVAP (9) - EFEVAP (IV9)
EFEXH (9) - EFEXH (IV9)
EFFTP (3,9) - EFFTP (IP, IV9)
EFIDLE (3,9) - EFIDLE (IP, IV9)
EFLOSS (9) - EFLOSS (IV9)
EFRUNL (9) - EFRUNL (IV9)
GSFVCT (8) - GSFVCT (IV)
ILDT (4) - ILDT (IVIM)
IMNAME (20,9) - IMNAME (JDX, NLIM)
JANMYR (20,8) - JANMYR (JDX, IV)
NUDATA (2) - NUDATA (ICR)
OFFCO (20,3) - OFFCO (JDX, IVP)
OFFMTH (20,8) - OFFMTH (JDX, IV)
PROJID (20) - PROJID (ICH)
TF (20,8) - TF (IDX, IV)
TFMYM (20,8) - TFMYM (JDX, IV)
TRAILR (3) - TRAILR (IP)
USRMPD (8) - USRMPD (IV)
USRTPD (8) - USRTPD (IV)
VFTP (3) - VFTP (IP)
VIDLE (3) - VIDLE (IP)
WAIVER (2) - WAIVER (IGW)
XLOAD (3) - XLOAD (IP)
XMYM (20,8) - XMYM (JDX, IV)

Common block dictionary:

Name	Type	Description
------	------	-------------

/ALUHIN/:

AC	R	a/c usage factor
XLOAD	R	extra load usage fractions
TRAILR	R	trailer towing usage fractions
ABSHUM	R	absolute humidity level
DB	R	dry bulb temperature
WB	R	wet bulb temperature

/ALUOUT/:

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527000

BLOCK DATA BD27

527001

C

527002

C

527003

C

527004

C

527005

C

527006

C

527007

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527008

C

527009

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527010

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527011

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527012

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527013

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527014

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527015

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527016

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527017

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527018

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527019

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527020

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527021

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527022

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527023

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527024

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527025

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527026

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527027

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527028

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527029

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527030

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527031

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527032

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527033

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527034

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527035

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527036

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527037

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527038

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527039

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527040

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527041

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527042

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527043

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527044

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527045

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527046

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527047

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527048

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527049

C

527050

C

527051

C

527052

C

527053

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527054

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527055

C

527056

C

527057

C

BLOCK DATA Subprogram 27: /ALUHIN/,/ALUOUT/,/BASEQ3/,/CEVCOM/,/CEVBMV/,
/CUMCOM/,/FLAGS1/,/FLAGS2/,/FLAGS3/,/FLAGS4/,
/IMPAR1/,/IMPAR2/,/MYRCAL/,/OFFSET/,/PROJEC/,
/REGISF/,/RESUL1/,/RESUL2/,/RESUL3/

BLOCK DATA 27's common blocks did not need to be initialized, so were
assigned dummy zeroes, to facilitate debugging, to prevent control statement
failure when compiled under a FORTRAN that does not employ the left to right
rule, etc.

Common block array subscripts:

ALHRET (20,4,3) - ALHRET (JDX, IG, IP)
BMYMPD (20,8) - BMYMPD (IG, IV)
BMYTPD (20,8) - BMYTPD (IG, IV)
CUMMIL (20,8) - CUMMIL (JDX, IV)
EFEVAP (9) - EFEVAP (IV9)
EFEXH (9) - EFEXH (IV9)
EFFTP (3,9) - EFFTP (IP, IV9)
EFIDLE (3,9) - EFIDLE (IP, IV9)
EFLOSS (9) - EFLOSS (IV9)
EFRUNL (9) - EFRUNL (IV9)
GSFVCT (8) - GSFVCT (IV)
ILDT (4) - ILDT (IVIM)
IMNAME (20,9) - IMNAME (JDX, NLIM)
JANMYR (20,8) - JANMYR (JDX, IV)
NUDATA (2) - NUDATA (ICR)
OFFCO (20,3) - OFFCO (JDX, IVP)
OFFMTH (20,8) - OFFMTH (JDX, IV)
PROJID (20) - PROJID (ICH)
TF (20,8) - TF (IDX, IV)
TFMYM (20,8) - TFMYM (JDX, IV)
TRAILR (3) - TRAILR (IP)
USRMPD (8) - USRMPD (IV)
USRTPD (8) - USRTPD (IV)
VFTP (3) - VFTP (IP)
VIDLE (3) - VIDLE (IP)
WAIVER (2) - WAIVER (IGW)
XLOAD (3) - XLOAD (IP)
XMYM (20,8) - XMYM (JDX, IV)

Common block dictionary:

Name	Type	Description
------	------	-------------

/ALUHIN/:

AC	R	a/c usage factor
XLOAD	R	extra load usage fractions
TRAILR	R	trailer towing usage fractions
ABSHUM	R	absolute humidity level
DB	R	dry bulb temperature
WB	R	wet bulb temperature

/ALUOUT/:

Appendix C: MOBILE4 Block Data 27

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527058	C	ALHRET	R	combined correction factor derived from user supplied data
527059	C			on a/c, extra load & trailer towing usage and on ambient
527060	C			humidity & temperature.
527061	C			
527062	C	/BASEQ3/:		
527063	C			
527064	C	NEWVEH	I	new emission rate's vehicle type code
527065	C	NEWMYF	I	new emission rate's first my of affected range
527066	C	NEWMYL	I	new emission rate's last my of affected range
527067	C	ZMLNEW	R	new emission rate's zero mile level (intercept)
527068	C	DRNEW	R	new emission rate's deterioration rate (slope)
527069	C	KINKS	I	flag signaling whether or not any kinked er's have been read
527070	C			for 1981+ LDGV HC/CO: 1 = no 2 = yes
527071	C			
527072	C	/CEVCOM/:		
527073	C			
527074	C	USRTPD	R	user supplied average trips per day
527075	C	USRMPD	R	user supplied average miles per day
527076	C			
527077	C	/CEVBMV/:		
527078	C			
527079	C	BMVMPD	R	by model year miles per day (MPD), calculated in CEVMPD
527080	C	BMVTPD	R	by model year TPD, calculated in CEVTPD
527081	C			
527082	C	/CUMCOM/:		
527083	C			
527084	C	CUMMIL	R	cumulative mileage accumulation rates
527085	C			
527086	C	/FLAGS1/:		
527087	C			
527088	C	PROMPT	I	decides Control Section flags read format & prompt status:
527089	C			1 = use vertical flag format; do not prompt
527090	C			2 = use vertical flag format; prompt for input
527091	C			3 = use horizontal flag format; do not prompt
527092	C			4 = use horizontal flag format; prompt for input
527093	C			Internally, VHMODE is assigned the flag format function.
527094	C			PROMPT is then reduced to the prompt function:
527095	C			1 = do not prompt for input
527096	C			2 = prompt for input
527097	C	TAMFLG	I	1 = use default tampering rates
527098	C			2 = user supplies tampering rates for 8 categories
527099	C	SPDFLG	I	1 = user supplies one speed for all vehicle types
527100	C			2 = user supplies 8 speeds, 1 for each vehicle type
527101	C	VMFLAG	I	1 = use default vmt mix
527102	C			2 = user supplies a new vmt mix for each scenario
527103	C			3 = user supplies 1 vmt mix to apply to all scenarios
527104	C			
527105	C	/FLAGS2/:		
527106	C			
527107	C	MYMRFG	I	1 = default registration distributions/mileage accrual rates
527108	C			2 = user supplies mileage accumulation rates
527109	C			3 = user supplies registration distributions
527110	C			4 = user supplies both
527111	C	NEWFLG	I	1 = use all default exhaust emission rates
527112	C			2 = replace up to 99 of the default rates; caution -
527113	C			(a) for IV = 4 or 7 (HDV), use gpbhp units instead of gpm
527114	C			(b) each IV x IP x IR case has a limit on new efs - see UG
527115	C	IMFLAG	I	1 = no I/M program

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527116	C		2 = specify and apply I/M program
527117	C	ALHFLG I	1 = no special correction factors
527118	C		2 = user supplies 6 values: 1 a/c use factor, 3 extra load
527119	C		usage fractions, 1 trailer towing fraction & 1 humidity
527120	C		level
527121	C		3 = user supplies 10 values: the 6 above, except 3 instead of
527122	C		1 towing fractions plus 1 db & 1 wb temperatures
527123	C		
527124	C	/FLAGS3/:	
527125	C		
527126	C	ATPFLG I	1 = no anti-tampering (A-T) program
527127	C		2 = specify A-T program to apply to all scenarios
527128	C	TPDFLG I	1 = use default calculated trips per day rates
527129	C		2 = user supplied data from which trips per day are calculated
527130	C	RLFLAG I	1 = refueling loss is always 0.0, same as release MOBILE3
527131	C	TEMFLG I	1 = use default calculated hot soak, exhaust,
527132	C		and running loss temperatures
527133	C		2 = use ambient temperature for hot soak, exhaust,
527134	C		and running loss temperatures
527135	C	LOCFLG I	1 = user enters a local area parameters record after the
527136	C		the required parameters record of each scenario
527137	C		2 = user enters 1 local area parameters record for all
527138	C		scenarios, placing it as the last record in one-time data.
527139	C		2 = if MY < 1989, then use 100% uncontrolled rate,
527140	C		else (MY >= 1989) use 100% controlled rate (no tampering)
527141	C		3 = if MY < 1989, then use 100% uncontrolled rate,
527142	C		else (MY >= 1989) use best estimate of tampering rate to
527143	C		weight uncontrolled & controlled (VRS installed) rates
527144	C		4 = use 100% uncontrolled refueling evap HC loss (no VRS's)
527145	C	OUTFMT I	various output format selections:
527146	C		1 = new for MOBILE4 long (212 column) numerical format
527147	C		2 = new for MOBILE4 short (130 column) numerical format
527148	C		3 = 112 column descriptive format
527149	C		4 = 80 column descriptive format
527150	C		
527151	C	/FLAGS4/:	
527152	C		
527153	C	PRTFLG I	1 = print only the HC factors
527154	C		2 = print only the CO factors
527155	C		3 = print only the NOX factors
527156	C		4 = print the factors for all three: HC, CO and NOX
527157	C	IDLFLG I	1 = do not print idle emission factors
527158	C		2 = print idle emission factors
527159	C	NMHFLG I	1 = print total HC emission factors
527160	C		2 = print non-methane HC emission factors
527161	C	HCFLAG I	1 = do not print HC components
527162	C		2 = print HC components (exhaust, evaporative, refueling loss)
527163	C		
527164	C	/IMPAR1/:	
527165	C		
527166	C	ICYIM I	I/M program start year
527167	C	ISTRIN I	Technology I/II stringency level of I/M program
527168	C	MODYR1 I	first (earliest) year included in the I/M program
527169	C	MODYR2 I	last (latest) year included in the I/M program
527170	C	WAIVER R	waiver rate - percent of reviewed fleet that is exempted from
527171	C		I/M testing
527172	C	CRIM R	enforcement level - percent of fleet reviewed for I/M testing
527173	C		WAIVER is based on CRIM: the percent of the total fleet

Appendix C: MOBILE4 Block Data 27

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527174 C tested = (1.0 - WAIVER(IGW)) * (CRIM * fleetsize),
 527175 C IGW = 1 for pre-1981 and IGW = 2 for 1981+ MY vehicles.
 527176 C
 527177 C /IMPAR2/:
 527178 C
 527179 C ILDT I inclusion vector - vehicle classes to be covered by I/M:
 527180 C 1 = omit 2 = included
 527181 C ITEST I technology IV+ test type:
 527182 C 1 = idle test
 527183 C 2 = 2500 rpm idle test
 527184 C 3 = loaded idle test
 527185 C NUDATA I new exhaust I/M credits data flag vector. The data is stored
 527186 C and thus replaceable in 2 array blocks:
 527187 C NUDATA(1) = Technology I/II LDGV/T I/M credits = CR12HC/CO
 527188 C NUDATA(2) = Technology IV+ LDGV I/M credits = CRD4VA/B
 527189 C For each of the 2 cases, the user has 2 choices:
 527190 C 1 = use default Block Data credits
 527191 C 2 = replace BD credits with user entered values
 527192 C NONUDA I flag identifying whether or not user supplies any FTP I/M
 527193 C credits:
 527194 C 1 = user supplies FTP I/M credits (at least one of the
 527195 C NUDATA flags is turned on).
 527196 C 2 = go with default FTP I/M credits (NO NU DATA)
 527197 C NLIM I number of lines in the I/M credits file title
 527198 C IMNAME I I/M credits file title (usually program type)
 527199 C
 527200 C /MYRCAL/:
 527201 C
 527202 C XMYM R January 1 model year mileage accumulation rates used to
 527203 C compute CUMMIL
 527204 C JANMYR R January 1 registration distributions
 527205 C TF R travel weighting fractions
 527206 C TFMYM R January 1 mileage accumulation rates used to compute TF
 527207 C
 527208 C /OFFSET/:
 527209 C
 527210 C OFFCO R CO offset to basic emission rate
 527211 C OFFMTH R methane offset to basic emission rate
 527212 C
 527213 C /PROJEC/:
 527214 C
 527215 C PROJID R user supplied project (i.e., run) title
 527216 C
 527217 C /REGISF/:
 527218 C
 527219 C GSFVCT R fleet gasoline/diesel sales fractions used to split LDV, LDT
 527220 C
 527221 C /RESUL1/:
 527222 C
 527223 C EFFTPT R composite (3 bag cycle weighted) FTP emission factor for each
 527224 C IV9 class = exhaust (+ evap/cc + refuel loss)
 527225 C EFEXH R exhaust component of IV9 HC ef
 527226 C EFEVAP R evaporative + crankcase component of IV9 HC ef
 527227 C EFLOSS R refueling loss component of IV9 HC ef
 527228 C EFRUNL R running loss component of IV9 HC ef
 527229 C
 527230 C /RESUL2/:
 527231 C

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```

527232 C EFIDLE R hot stabilized idle emission factor for each IV9 class
527233 C
527234 C /RESUL3/:
527235 C
527236 C Prefix in v/a in /RESUL3/:
527237 C
527238 C 'V' = vmtmix weighted (ALLVEH IP, each IV's ef weighted by its VMTMIX)
527239 C
527240 C VFTP R For each IP, FTP emission factor for each IV class weighted by
527241 C corresponding normalized vmt mix fraction and summed together
527242 C
527243 C VEXH R vmt mix weighted local (city) exhaust HC
527244 C VEVAP R vmt mix weighted local (city) evaporative HC
527245 C VLOSS R vmt mix weighted local (city) refueling loss HC
527246 C VIDLE R For each IP, idle emission factor for each IV class weighted by
527247 C corresponding normalized vmt mix fraction and summed together
527248 C
527249 C Notes:
527250 C
527251 C /RESUL3/ was added for MOBILE4.
527252 C /REGION/, /SCENE1/ and /SCENE2/ were moved to BD 33 for MOBILE4.
527253 C BD 27 was modified in MOBILE4 to eliminate parameters relating to no
527254 C longer used separate I/M idle (all veh) and I/M exhaust LDGT1/2 credits,
527255 C plus put a model year kink (1981) in the I/M waiver rate and rename the
527256 C enforcement parameter (was same as the enforcement function name).
527257 C BD 27 was modified for MOBILE4, making TPDFLG=3 and adding TEMFLG
527258 C
527259 C CHARACTER*4 IMNAME,PROJID
527260 C INTEGER PROMPT,TAMFLG,SPDFLG,VMFLAG
527261 C INTEGER ALHFLG
527262 C INTEGER ATPFLG,TPDFLG,RLFLAG,TEMFLG,OUTFMT
527263 C INTEGER PRTFLG,HCFLAG
527264 C REAL JANMYR
527265 C
527266 C COMMON /ALUHIN/ AC,XLOAD(3),TRAILR(3),ABSHUM,DB,WB
527267 C COMMON /ALUOUT/ ALHRET(20,4,3)
527268 C COMMON /BASEQ3/ NEWVEH,NEWMYF,NEWMYL,ZMLNEW,DRNEW,KINKS
527269 C COMMON /CEVCOM/ USRTPD(8),USRMPD(8)
527270 C COMMON /CEVBMV/ BMYMPD(20,8),BMYTPD(20,8)
527271 C COMMON /CUMCOM/ CUMMIL(20,8)
527272 C COMMON /FLAGS1/ PROMPT,TAMFLG,SPDFLG,VMFLAG
527273 C COMMON /FLAGS2/ MYMRFG,NEWFLG,IMFLAG,ALHFLG
527274 C COMMON /FLAGS3/ ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT
527275 C COMMON /FLAGS4/ PRTFLG,IDLFLG,NMHFLG,HCFLAG
527276 C COMMON /IMPAR1/ ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER(2),CRIM
527277 C COMMON /IMPAR2/ ILDT(4),ITEST,NUDATA(2),NONUDA,NLIM,IMNAME(20,9)
527278 C COMMON /MYRCAL/ XMYM(20,8),JANMYR(20,8),TF(20,8),TFMYM(20,8)
527279 C COMMON /OFFSET/ OFFCO(20,3),OFFMTH(20,8)
527280 C COMMON /PROJEC/ PROJID(20)
527281 C COMMON /REGISF/ GSFVCT(8)
527282 C COMMON /RESUL1/ EFFT(3,9),EFEXH(9),EFEVAP(9),EFLOSS(9),EFRUNL(9)
527283 C COMMON /RESUL2/ EFIDLE(3,9)
527284 C COMMON /RESUL3/ VFTP(3),VEXH,VEVAP,VLOSS,VRUNLS,VIDLE(3)
527285 C
527286 C DATA AC,XLOAD,TRAILR,ABSHUM,DB,WB/10*0.0/
527287 C DATA ALHRET/240*0.0/
527288 C DATA NEWVEH,NEWMYF,NEWMYL,ZMLNEW,DRNEW/3*0.2*0.0/,KINKS/1/
527289 C DATA USRTPD,USRMPD/16*0.0/

```


Appendix C: MOBILE4 Block Data 27

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527290 DATA BMYMPD,BMYTPD/320*0.0/
527291 DATA CUMMIL/160*0.0/
527292 DATA PROMPT,TAMFLG,SPDFLG,VMFLAG/4*0/
527293 DATA MYMRFG,NEWFLG,IMFLAG,ALHFLG/4*0/
527294 DATA ATPFLG,TPDFLG,RLFLAG,LOCFLG,TEMFLG,OUTFMT/0,3,4*0/
527295 DATA PRTFLG,IDLFLG,NMHFLG,HCFLAG/4*0/
527296 DATA ICYIM,ISTRIN,MODYR1,MODYR2,WAIVER,CRIM/4*0,3*0.0/
527297 DATA ILDT,ITEST,NUDATA,NONUDA,NLIM,IMNAME/9*0,180*' '/
527298 DATA XMYM,JANMYR,TF,TFMYM/640*0.0/
527299 DATA OFFCO,OFFMTH/220*0.0/
527300 DATA PROJID/20*' '/
527301 DATA GSFVCT/8*0.0/
527302 DATA EFFTP,EFEXH,EFEVAP,EFLLOSS,EFRUNL/63*0.0/
527303 DATA EFIDLE/27*0.0/
527304 DATA VFTP,VEXH,VEVAP,VLOSS,VRUNLS,VIDLE/10*0.0/
527305 C
527306 END

Appendix C: MOBILE4 Block Data 28

May 5, 1989

```

528000      BLOCK DATA BD28
528001      C
528002      C BLOCK DATA Subprogram 28: /RLCOM1/,/RLCOM2/,/RLCOM3/
528003      C
528004      C BLOCK DATA 28 defines the refueling loss HC emission factor common blocks.
528005      C
528006      C Common block array subscripts:
528007      C
528008      C IVOB (4)      - IVOB  ( IVTAM )
528009      C OBDP (4)      - OBDP  ( IVTAM )
528010      C RLRATE (20,4) - RLRATE ( IDX, IVTAM )
528011      C ROADFE (32,4) - ROADFE ( MDX, IVTAM )
528012      C
528013      C Common block dictionary:
528014      C
528015      C   Name      Type      Description
528016      C   -----
528017      C /RLCOM1/ block data supplied parameters for refueling loss calculation
528018      C
528019      C ROADFE  R      road fuel economy rates for converting refueling loss HC rates
528020      C                      from grams per gallon (GPG) to grams per mile (GPM).
528021      C DISPL   R      HC displacement component of refueling loss, in GPG.
528022      C SPILL   R      HC spillage component of refueling loss, in GPG.
528023      C OBED    R      Onboard VRS displacement loss reduction efficiency percentage
528024      C OBES    R      Onboard VRS spillage loss reduction efficiency percentage
528025      C OBDP    R      Onboard VRS deterioration factor
528026      C
528027      C /RLCOM2/ user supplied parameters for refueling loss calculation:
528028      C
528029      C IOBMY    I      first model year of onboard vrs installation. All gas vehicles
528030      C                      produced in this and all subsequent years are assumed to have
528031      C                      onboard vapor recovery systems installed.
528032      C IVOB     I      switch vector controlling which tampering vehicle classes
528033      C                      are to be affected by ob vrs's this run:
528034      C                      IVOB(IVTAM) = 1 (no) or 2 (yes), IVTAM=1,2,3,4
528035      C IS2SY    I      Stage II vrs controls start year.
528036      C NPHASE   I      Number of years in the phase-in period of Stage II vrs
528037      C                      controls.
528038      C S2EFF     R      Stage II efficiency = percentage of refueling losses removed
528039      C                      by S2 installation, assuming 100% installation.
528040      C
528041      C /RLCOM3/ calculated refueling loss rates for current scenario:
528042      C
528043      C RLRATE    R      refueling loss HC rates for current scenario, as determined by
528044      C                      subprogram REFUEL. The loss rates are weighted by ICY's
528045      C                      corresponding TF's and summed to get a scenario's EFLOSS.
528046      C
528047      C Notes:
528048      C
528049      C The MDX mapping to MY for ROADFE is:
528050      C
528051      C MDX      MY
528052      C 1         1941-1969
528053      C 2-31     1970-1999 (i.e., MDX=MY-1969+1)
528054      C 32       2000-2020
528055      C
528056      C BD 28 was added for MOBILE4.
528057      C BD 28 was modified in MOBILE4, updating DISPL, SPILL and 1 value

```

Appendix C: MOBILE4 Block Data 28

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```

528058 C of ROADFE.
528059 C
528060 C
528061 COMMON /RLCOM1/ ROADFE (32,4),DISPL,SPILL,OBED,OBES,OBDF (4)
528062 COMMON /RLCOM2/ IOBMY,IVOB (4),IS2SY,NPHASE,S2EFF (4)
528063 COMMON /RLCOM3/ RLRATE (20,4)
528064 C
528065 C /RLCOM1/:
528066 C
528067 DATA ROADFE/
528068 C LDGV
528069 1 12.7, 12.8, 12.3, 12.4, 12.2, 12.2, 13.5, 14.9,
528070 1 15.6, 17.0, 17.2, 19.8, 21.2, 21.9, 21.7, 22.0,
528071 1 22.6, 23.3, 23.6, 23.7, 23.6, 23.6, 23.6, 23.6,
528072 1 23.5, 23.5, 23.5, 23.5, 23.4, 23.4, 23.4, 23.3,
528073 C LDGT1
528074 2 11.1, 11.1, 10.7, 10.8, 10.6, 10.6, 11.9, 12.3,
528075 2 13.3, 13.0, 12.6, 15.7, 17.0, 17.3, 17.6, 17.2,
528076 2 17.3, 18.0, 18.0, 17.7, 17.8, 17.8, 17.8, 17.8,
528077 2 17.7, 17.7, 17.7, 17.7, 17.7, 17.6, 17.6, 17.6,
528078 C LDGT2
528079 3 11.1, 11.1, 10.7, 10.8, 10.6, 10.6, 11.9, 12.3,
528080 3 13.3, 13.0, 12.6, 15.7, 17.0, 17.3, 17.6, 17.2,
528081 3 17.3, 18.0, 18.0, 17.7, 17.8, 17.8, 17.8, 17.8,
528082 3 17.7, 17.7, 17.7, 17.7, 17.7, 17.6, 17.6, 17.6,
528083 C HDGV
528084 4 6.45, 6.45, 6.08, 5.70, 6.10, 6.50, 6.92, 6.81,
528085 4 7.16, 7.74, 8.07, 8.75, 9.09, 9.45, 9.95, 10.01,
528086 4 10.01, 10.03, 10.05, 10.13, 10.19, 10.26, 10.33, 10.42,
528087 4 10.61, 10.72, 10.79, 10.88, 10.87, 10.94, 11.00, 11.08/
528088 C
528089 C Suggested nonzero OBDF values are .0002 for LDGV and .0005 LDGT1/2 & HDGV.
528090 C
528091 DATA DISPL/5.46/,SPILL/.31/,OBED/.98/,OBES/.50/,OBDF/4*0.0/
528092 C
528093 C /RLCOM2/:
528094 C
528095 DATA IOBMY/2020/,IVOB/4*1/,IS2SY/2020/,NPHASE/4/,S2EFF/4*0.0/
528096 C
528097 C /RLCOM3/:
528098 C
528099 DATA RLRATE/80*0.0/
528100 C
528101 END

```

Appendix C: MOBILE4 Block Data 29

May 5, 1989

```

529000      BLOCK DATA BD29
529001      C
529002      C BLOCK DATA Subprogram 29: /HDCCOM/
529003      C
529004      C BLOCK DATA 29 initializes grams-per-brakehorsepower-hour to grams-per-mile
529005      C units conversion variables.
529006      C
529007      C Common block array subscripts:
529008      C
529009      C HDCFAC(37,2) - HDCFAC ( 1G, 1VHD )
529010      C
529011      C Common block dictionary:
529012      C
529013      C      Name      Type      Description
529014      C      -----
529015      C /HDCCOM/:
529016      C
529017      C HDCFAC      R      HDV gpbhp to gpm conversion factors
529018      C LOWYR       I      lowest my for which HDCFAC is defined. All my < LOWYR are
529019      C                      assigned LOWYR's conversion factors.
529020      C MAXCIG      I      maximum HDCFAC index allowed = 1st dimension of HDCFAC = 37
529021      C                      = index of highest my for which HDCFAC is defined, currently
529022      C                      1997. All my > 1997 are assigned MAXCIG's factors.
529023      C
529024      C Local array subscripts:
529025      C
529026      C HDCGAS(37) - HDCGAS ( 1G )
529027      C HDCDIE(37) - HDCDIE ( 1G )
529028      C
529029      C Local array dictionary:
529030      C
529031      C      Name      Type      Description
529032      C      -----
529033      C HDCGAS      R      HDGV gpbhp to gpm units conversion factors
529034      C HDCDIE      R      HDDV gpbhp to gpm units conversion factors
529035      C
529036      C BD 29 was added for MOBILE4.
529037      C The conversion factors were updated for MOBILE4, with MAXCIG 36 to 37.
529038      C
529039      C
529040      COMMON /HDCCOM/ HDCFAC(37,2),LOWYR,MAXCIG
529041      C
529042      DIMENSION HDCGAS(37),HDCDIE(37)
529043      C
529044      EQUIVALENCE
529045      *      (HDCFAC(1,1),HDCGAS(1)),
529046      *      (HDCFAC(1,2),HDCDIE(1))
529047      C
529048      C Gpbhp to gpm units conversion factors
529049      C
529050      C For HDGV
529051      C
529052      DATA HDCGAS/
529053      *      1.548, 1.536, 1.536, 1.527, 1.516, 1.518, 1.497, 1.479, 1.449,
529054      *      1.449, 1.437, 1.419, 1.422, 1.313, 1.244, 1.073, 1.057, 1.022,
529055      *      0.961, 0.935, 0.912, 0.884, 0.907, 0.896, 0.894, 0.897, 0.895,
529056      *      0.894, 0.893, 0.893, 0.892, 0.891, 0.890, 0.889, 0.887, 0.886,
529057      *      0.885/

```

Appendix C: MOBILE4 Block Data 29

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```
529058 C
529059 C For HDDV
529060 C
529061 DATA HDCDIE/
529062 * 2.850, 2.858, 2.874, 2.890, 2.900, 2.964, 2.995, 3.074, 3.100,
529063 * 3.161, 3.197, 3.188, 3.213, 3.146, 3.179, 3.246, 3.187, 2.999,
529064 * 2.716, 2.698, 2.376, 2.277, 2.406, 2.211, 2.214, 2.167, 2.132,
529065 * 2.099, 2.066, 2.050, 2.033, 2.033, 2.033, 2.039, 2.039, 2.037,
529066 * 2.036/
529067 C
529068 DATA LOWYR,MAXCIG/1962,37/
529069 C
529070 END
```

```

530000      BLOCK DATA BD30
530001      C
530002      C BLOCK DATA Subprogram 30: /CITCIN/,/CITPAR/,/CITRV1/,/CITRV2/,/CITRV3/,
530003      C /CITUSE/,/INJECT/
530004      C
530005      C BLOCK DATA 30 defines the parameters for reading in, storing and using
530006      C the second required scenario record (local data) parameters, plus fuel
530007      C injection rates and model year groups.
530008      C
530009      C Common block array subscripts:
530010      C
530011      C ACLASS(5) - ACLASS ( ICLASS )
530012      C PFI(13,4) - PFI ( IG5, IVTAM )
530013      C RVPMAP(5) - RVPMAP ( ICLASS )
530014      C RVPX(2,2) - RVPX ( ICER, IFUEL )
530015      C SCNAME(4) - SCNAME ( ICH )
530016      C TBI(13,4) - TBI ( IG5, IVTAM )
530017      C UDI(5) - UDI ( IUDI )
530018      C
530019      C Common block dictionary:
530020      C
530021      C      Name      Type      Dictionary
530022      C      -----
530023      C /CITCIN/:
530024      C
530025      C      UDI      R      Uncontrolled Diurnal rate, g/test, at:
530026      C                      1 = standard FTP conditions
530027      C                      2 = local area conditions
530028      C                      3 = 8AM-11AM conditions
530029      C                      4 = 10AM-3PM conditions
530030      C                      5 = 8AM-2PM conditions
530031      C      CIGAS1   R      city gasoline diurnal index, using local base or in-use RVP
530032      C      CIGAS2   R      city gasoline diurnal index, using national certification RVP
530033      C      CIETH1   R      city ethanol diurnal index, using local base or in-use RVP
530034      C      CIETH2   R      city ethanol diurnal index, using national certification RVP
530035      C      ICERSW   I      switch indicating whether or not certification controls are in
530036      C                      effect on before the evaluation year of current scenario:
530037      C                      1 = no      2 = yes
530038      C
530039      C /CITPAR/:
530040      C
530041      C      SCNAME    R      scenario identification field: echoed in numeric formats
530042      C      FRETH     R      ethanol blend fraction of SCNAME's fuel
530043      C      FRMETH    R      methanol blend fraction of SCNAME's fuel: 0.0 unless the
530044      C                      block data initialization is changed by modifying the source
530045      C                      code (no user optional input field applies).
530046      C      FRGAS     R      gasoline fraction of SCNAME's fuel
530047      C
530048      C /CITRV1/:
530049      C
530050      C      RVPBAS    R      SCNAME's base RVP
530051      C      RVPIUS    R      SCNAME's in-use RVP
530052      C      RVPAST    R      SCNAME's maximum ASTM limit RVP
530053      C      RVPICY    R      RVP to be used for not cert controlled my for SCNAME:
530054      C                      = RVPBAS if ICY .LT. IUSESY
530055      C                      = RVPIUS if ICY .GE. IUSESY
530056      C      RVPETH    R      SCNAME's ethanol blend RVP for not cert controlled my:
530057      C                      = RVPICY + EINCR

```



```

530058 C IUSESY I start year of in-use fuel volatility control program
530059 C RATUNC R (11.5 - (RVPAST - RVPIUS) ) / RVP115 : if IUSESY .LE. ICY,
530060 C then RATUNC is used to adjust uncontrolled displacement
530061 C refueling losses for in-use RVP controls.
530062 C
530063 C /CITRV2/:
530064 C
530065 C RVPHS1 R RVP in untampered/uncontrolled HS = RVPICY * (11.5 / RVPAST)
530066 C RVPHS2 R RVP in cert fuel change HS = RVPHS1 * (9.0 / RVP CER)
530067 C RVPET1 R RVPHS1 calculated with RVPETH instead of RVPICY (ethanol case)
530068 C RVPET2 R RVPHS2 calculated with RVPETH instead of RVPICY (ethanol case)
530069 C RVP090 R RVP in RVP CER cases prior to ICERSY, in denominator of Diurnal
530070 C Index equation & to normalize RVP CER. ASTM Class A RVP UB.
530071 C RVP100 R ASTM Class B RVP Upper Bound (UB)
530072 C RVP115 R Uncontrolled RVP. Also, ASTM Class C RVP UB.
530073 C
530074 C /CITRV3/:
530075 C
530076 C Note: RVP MAP & RVP X are placed 1st/2nd, not 3rd/4th, else they would
530077 C not start on a fullword boundary (Len of ASTMCL + ACLASS = 6 bytes).
530078 C
530079 C RVP MAP R Maps ACLASS subscript for matched class to ASTM max RVP.
530080 C RVP X R The 4 (possible) RVPs for use in calculating the RVP exhaust
530081 C (and depending on the case, temperature) correction factor
530082 C RVP X now equals the corresponding evaporative RVP HS/ET1&2.
530083 C ICLASS I Integer equivalent of ASTM Volatility Classes:
530084 C 1 = A, 2 = B, 3 = C, 4 = D, 5 = E
530085 C ASTMCL C*1 Entered ASTM Volatility (RVP) Class for scenario's location.
530086 C ACLASS C*1 ASTM Volatility Classes (A - E), to identify entered class.
530087 C
530088 C /CITUSE/: These variables are assigned 1 set of values on the gasoline
530089 C fuel call to CCEVRT and another set on the ethanol call (the
530090 C latter occurs if FRETH > 0.0).
530091 C
530092 C gasoline case ethanol case
530093 C -----
530094 C RVUSE1 R RVP HS1 RVPET1
530095 C RVUSE2 R RVP HS2 RVPET2
530096 C CIUSE1 R CIGAS1 CIETH1
530097 C CIUSE2 R CIGAS2 CIETH2
530098 C
530099 C /INJECT/:
530100 C
530101 C TBI I throttle body fuel injected fraction of IVGAS built in IG5
530102 C PFI I port fuel injected fraction of veh class IVGAS built in IG5
530103 C MAXFIY I first year of highest myg for indexing TBI & PFI.
530104 C MINFIY I last year of lowest myg for indexing TBI & PFI.
530105 C
530106 C Notes:
530107 C
530108 C BD 30 was added for MOBILE4.
530109 C BD 30 was modified for MOBILE4.
530110 C
530111 C
530112 C CHARACTER*1 ASTMCL,ACCLASS
530113 C CHARACTER*4 SCNAME
530114 C
530115 C COMMON /CITCIN/ UDI(5),IUDI,CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW

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```

530116 COMMON /CITPAR/ SCNAME(4),FRETH,FRMETH,FRGAS
530117 COMMON /CITRV1/ RVPBAS,RVPIUS,RVPAST,RVPICY,RVPETH,IUSESY,RATUNC
530118 COMMON /CITRV2/ RVPHS1,RVPHS2,RVPET1,RVPET2,RVPO90,RVP100,RVP115
530119 COMMON /CITRV3/ RVPX(2,2),ICLASS,ASTMCL,ACLASS(5)
530120 COMMON /CITUSE/ RVUSE1,RVUSE2,CIUUSE1,CIUUSE2
530121 COMMON /INJECT/ TBI(13,4),PFI(13,4),MAXFIY,MINFIY
530122 C
530123 C
530124 C The /CIT???/ variables / arrays get their values by being:
530125 C
530126 C Assigned in LOCAL/RDCITY/CALUDI as follows:
530127 C
530128 C supplied by user: SCNAME(4),ASTMCL,RVPBAS,RVPIUS,IUSESY,FRETH
530129 C
530130 C calculated by code: CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW,RVPICY,
530131 C RVPETH,RVPHS1,RVPHS2,RVPET1,RVPET2,RATUNC,RVPX,ICLASS
530132 C
530133 C Assigned in CCEVRT: all /CITUSE/ - RVUSE1,RVUSE2,CIUUSE1,CIUUSE2
530134 C
530135 C The only constants are methanol fraction ("permanently" zero) of /CITPAR/,
530136 C the controlled and uncontrolled RVP standard values of /CITRV2/ and the ASTM
530137 C RVP identification and mapping vectors of /CITRV3/:
530138 C
530139 C DATA FRMETH/0.0/,RVPO90/9.0/,RVP100/10.0/,RVP115/11.5/
530140 C
530141 C ICLASS: 1 2 3 4 5
530142 C DATA ACLASS/ 'A', 'B', 'C', 'D', 'E' /
530143 C DATA RVPX/ 9.0, 10.0, 11.5, 13.5, 15.0 /
530144 C
530145 C Dummy zeroes are assigned the remaining variables and arrays.
530146 C
530147 C DATA UDI,CIGAS1,CIGAS2,CIETH1,CIETH2,ICERSW/9*0.0,0/
530148 C DATA SCNAME,FRETH,FRGAS/4*' ',2*0.0/
530149 C DATA RVPBAS,RVPIUS,RVPAST,RVPICY,RVPETH,IUSESY,RATUNC/7*0.0/
530150 C DATA RVPHS1,RVPHS2,RVPET1,RVPET2/4*0.0/
530151 C DATA RVPX/4*0.0/,ICLASS/0/,ASTMCL/' '/
530152 C DATA RVUSE1,RVUSE2,CIUUSE1,CIUUSE2/4*0.0/
530153 C
530154 C /INJECT/: no provision exists for user modification of the fuel injection
530155 C fractions or their model year groups.
530156 C
530157 C DATA MAXFIY/1992/,MINFIY/1980/
530158 C
530159 C Both TBI and PFI have the IVTAM continuation code:
530160 C 1 = LDGV
530161 C 2 = LDGT1
530162 C 3 = LDGT2
530163 C 4 = HDGV
530164 C Each line has 8 (model year group) values
530165 C
530166 C Notes:
530167 C
530168 C 1) LDGT1 = LDGT2 values
530169 C 2) All HDGV values = 0.0/0, since for now HDGV's are assumed to
530170 C be 100% carbureted.
530171 C 3) For tampering, the fractions are only used to weight hot soak rates.
530172 C 4) Before 1981, it is assumed that no vehicle of any type had
530173 C fuel injection and therefore hot soak rates are for those years

```

Appendix C: MOBILE4 Block Data 30

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[illegible]

```

531000      BLOCK DATA BD31
531001      C
531002      C BLOCK DATA Subprogram 31: /RVPEX1/,/RVPEX2/,/RVPNAT/
531003      C
531004      C BLOCK DATA 31 initializes exhaust emission factor RVP correction factor (cf)
531005      C calculation variables.
531006      C
531007      C Common block array subscripts:
531008      C
531009      C MYGRVP(4,4)      - MYGRVP ( IG, IVTAM )
531010      C RVPCF(20,3,4,2) - RVPCF ( IDX, IP, IVTAM, IFUEL )
531011      C RVPDIU(2)      - RVPDIU ( LIMIT )
531012      C RVPLIM(2)      - RVPLIM ( LIMIT )
531013      C RG23(3,3,3,2)  - RG23 ( IRQ3, IB, IP, IG )
531014      C R9G1(3,2)     - R9G1 ( IRQ1, IP ) (IP=1,2)
531015      C TLL(2)       - TLL ( IRQ2 )
531016      C
531017      C Common block dictionary:
531018      C
531019      C      Name      Type      Dictionary
531020      C      -----
531021      C /RVPEX1/:
531022      C
531023      C R9G1      R      RVP cf normalized at RVP=9.0 equation coeff used by RVP IG=1
531024      C RG23      R      RVP & high T combined cf equation coeff used by RVP IG=2,3
531025      C                      The 1st (a1) coeff is also used to set the ub (FTP T) of the
531026      C                      low T IG=2,3 interpolation interval.
531027      C TLL      R      RVP cf temperature range lb & length for MYG 1 & low T MYG 2&3
531028      C
531029      C /RVPEX2/:
531030      C
531031      C MYGRVP      I      upper bound years for RVP CF MYGs
531032      C RVPCF      R      multiplicative RVP cf's, applied to corresponding exhaust ef's
531033      C                      in EFCALX & HCCALX; 2 sets: IFUEL = 1 gas/methanol & 2 ethanol
531034      C OPENCR      R      open loop technology HC & CO credit, expressed as percentage
531035      C
531036      C /RVPNAT/:
531037      C
531038      C ICERSY      I      start year of certification fuel volatility control program
531039      C RVP CER      R      certification fuel control program RVP, fixed wrt fuel type
531040      C RVPLIM      R      RVP value limits for constraining RVPBAS, RVPIUS and RVPUNC
531041      C                      1 = lower bound 2 = upper bound
531042      C RVPDIU      R      RVP value limits for constraining RVPICY, again 1=lb & 2=ub
531043      C PFUL      R      Percent of fuel tank filled
531044      C EINCR      R      ethanol RVP increment (RVP "penalty" for using ethanol blend)
531045      C
531046      C Notes:
531047      C
531048      C BD 31 was added for MOBILE4.
531049      C BD 31 was modified for MOBILE4 to accomodate the new RVP CF algorithms.
531050      C
531051      C
531052      C      COMMON /RVPEX1/ R9G1(3,2),RG23(3,3,3,2),TLL(2)
531053      C      COMMON /RVPEX2/ MYGRVP(4,4),RVPCF(20,3,4,2),OPENCR
531054      C      COMMON /RVPNAT/ ICERSY,RVP CER,RVPLIM(2),RVPDIU(2),PFUL,EINCR
531055      C
531056      C /RVPEX1/: These are the hardcoded terms of the RVP cf equations.
531057      C

```



```

531058 C The continuation line code for R9G1 is 1P.
531059 C
531060 DATA R9G1/
531061 C Numerator Denominator
531062 C Intercept Slope
531063 1 0.56222, 0.012512, 0.67483,
531064 2 7.1656, 0.33413, 10.17277/
531065 C
531066 C The continuation line code for RG23 is 1B.
531067 C
531068 DATA RG23/
531069 C a1 a2 a3
531070 C 1G=2 (= 1980-82 for LDGV)
531071 C HC
531072 1 0.091402, 0.0044270, 0.0029466,
531073 2 0.042060, 0.0048358, 0.0,
531074 3 0.093179, 0.0074688, 0.0047276,
531075 C CO
531076 1 0.091345, 0.0062182, 0.0,
531077 2 0.139680, 0.0149430, 0.0,
531078 3 0.163220, 0.0149230, 0.0,
531079 C NOx
531080 1 0.0, 0.0, 0.0,
531081 2 -0.040024, 0.0, 0.0,
531082 3 0.0, 0.0, 0.0,
531083 C
531084 C 1G=3 (= 1983+ for LDGV)
531085 C HC
531086 1 0.023202, 0.0, 0.0,
531087 2 0.153730, 0.0086550, 0.0,
531088 3 0.132630, 0.0083730, 0.0056009,
531089 C CO
531090 1 0.040748, 0.0035170, 0.0,
531091 2 0.262140, 0.0149660, 0.0056416,
531092 3 0.232180, 0.0206950, 0.0082344,
531093 C NOx
531094 1 0.014219, 0.0, 0.0,
531095 2 0.027491, 0.0037789, 0.0,
531096 3 0.0, 0.0, 0.0/
531097 C
531098 DATA TLL/
531099 C LB of Temperature Interval Interval Length
531100 * 40.0, 35.0/
531101 C
531102 C /RVPEX2/: RVPCF is computed by RVPEXH.
531103 C
531104 C The MYGRVP continuation code is 1VTAM.
531105 C
531106 DATA MYGRVP/
531107 C MYG0 MYG1 MYG2 MYG3
531108 1 1970, 1979, 1982, 2020,
531109 2 1970, 1980, 1985, 2020,
531110 3 1978, 1980, 1985, 2020,
531111 4 1984, 0000, 2020, 0000/
531112 C
531113 DATA RVPCF/480*1.0/,OPENCR/0.13/
531114 C
531115 C /RVPNAT/: All variables but RVPLIM were required to be read into One-time

```


Appendix C: MOBILE4 Block Data 31

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531116 C Data. MOBILE4 hardcoded all the parameters, removing them
531117 C from user control. In particular, setting ICERSY = 2020 zaps the
531118 C certification RVP feature, the related source code left in only
531119 C for use in "in-house" versions of MOBILE4. MOBILE4 added RVPDIU
531120 C derived from RVPLIM, so initialized here to the same limits.
531121 C
531122 DATA ICERSY/2020/,RVPCER/9.0/,RVPLIM/7.0,15.2/,RVPDIU/7.0,15.2/
531123 DATA PFUL/54.57/,EINCR/1.2/
531124 C
531125 END

```

532000      BLOCK DATA BD32
532001      C
532002      C BLOCK DATA Subprogram 32: /IMPAR3/,/IMPAR5/,/IMPAR6/
532003      C
532004      C BLOCK DATA 32 initializes I/M program parameters.
532005      C
532006      C Common block array subscripts:
532007      C
532008      C CRHDGV(2,2)      - CRHDGV ( IP, IFREQ )
532009      C DISCNT(3)       - DISCNT ( INTYP )
532010      C MYGIM2(3,3)   - MYGIM2 ( IG, IVLDG )
532011      C
532012      C Common block dictionary:
532013      C
532014      C      Name      Type      Description
532015      C      -----
532016      C /IMPAR3/:
532017      C
532018      C IMDX1      I      IDX order pointer to first model year covered by I/M program
532019      C IMDX2      I      IDX order pointer to last model year covered by I/M program
532020      C IMCASE     I      flag relating run's I/M program to scenario's calendar year:
532021      C                      1 = no I/M for ICY
532022      C                      2 = I/M for at least a subset of ICY's IVTAM and IDX
532023      C IMVEH      I      flag relating run's I/M program to tampering vehicle class:
532024      C                      1 = no I/M for this IVTAM
532025      C                      2 = I/M for all or part of IVTAM's IDX=2,...,MAXYRS window
532026      C IM          I      flag relating run's I/M program to relative model year IDX:
532027      C                      1 = no I/M for this IDX
532028      C                      2 = I/M for this IDX, given ICY, IVTAM & I/M parameters
532029      C                      IM is used to index I/M dependent data arrays (TAMZML,TAMDR).
532030      C
532031      C /IMPAR5/:
532032      C
532033      C MYGIM2      I      mygs for IM technologies 1 and 2 (3 is treated as 2, for I/M)
532034      C LBIM4P      I      lb of last myg of the tech 4+ class (its ub is 2020)
532035      C CRHDGV      R      BEF I/M credit adjustment for HDGV for HC & CO, annu/biennial
532036      C DISCNT      R      I/M program efficiency discount as a f(INTYP)
532037      C
532038      C /IMPAR6/:
532039      C
532040      C IFREQ        I      I/M Program vehicle inspection frequency: 1=annual,2=biennial
532041      C INTYP        I      I/M Program type: 1 = Centralized,
532042      C                      2 = Decentralized Computerized, 3 = Decentralized Manual
532043      C
532044      C BD 32 was added for MOBILE4.
532045      C BD 32 was modified in MOBILE4 to remove idle I/M credits and update the
532046      C exhaust I/M credit parameter options and HDGV I/M credits.
532047      C
532048      C
532049      C      COMMON /IMPAR3/ IMDX1,IMDX2,IMCASE,IMVEH,IM
532050      C      COMMON /IMPAR5/ MYGIM2(3,3),LBIM4P,CRHDGV(2,2),DISCNT(3)
532051      C      COMMON /IMPAR6/ IFREQ,INTYP
532052      C
532053      C /IMPAR3/:
532054      C
532055      C      DATA IMDX1/1951/, IMDX2/2020/, IMCASE/1/, IMVEH/1/, IM/1/
532056      C
532057      C /IMPAR5/

```

Appendix C: MOBILE4 Block Data 32

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```
532053 C
532059 C MYGIM2 continuation code is IVLDG.
532060 C TECH
532061 C      1      2      3
532062 C DATA MYGIM2/
532063 C      1      1974, 1979, 1980,
532064 C      2      1974, 1980, 1983,
532065 C      3      1978, 1980, 1983/
532066 C
532067 C DATA LBIM4P/1992/,CRHDGV/.1250,.1575,.0625,.1050/
532068 C
532069 C DATA DISCNT/1.0, 1.0, 0.50/
532070 C
532071 C DATA IFREQ,INTYP/2*1/
532072 C
532073 C END
```

```

533000      BLOCK DATA BD33
533001      C
533002      C BLOCK DATA Subprogram 33: /REGION/,/SCENE1/,/SCENE2/
533003      C
533004      C BLOCK DATA 33 defines common blocks related to the first scenario record.
533005      C
533006      C Common block array subscripts:
533007      C
533008      C FEET(2) - FEET ( IREJN )
533009      C SPD(2) - SPD ( IV )
533010      C
533011      C Common block dictionary:
533012      C
533013      C   Name      Type      Description
533014      C   -----
533015      C /REGION/:
533016      C
533017      C IREJN      I      user supplied region code: 1 = low altitude, 2 = high
533018      C                      1 = low altitude region
533019      C                      2 = high altitude region
533020      C ALT        R      altitude in feet
533021      C INITPR     I      switch: 1 = 1st scenario's output pass, print run parameters
533022      C                      0 = 2nd or later, do not 'CALL OUTHD<OUTFMT>'
533023      C
533024      C /SCENE1/:
533025      C
533026      C SPD          R      user supplied average speeds of 8 vehicle types
533027      C PCCN          R      user supplied % in cold start mode by non-catalyst
533028      C                      equipped vehicle types
533029      C PCHC          R      user supplied % in hot start mode by catalyst
533030      C                      equipped vehicle types
533031      C PCCC          R      user supplied % in cold start mode by catalyst
533032      C                      equipped vehicle types
533033      C
533034      C /SCENE2/:
533035      C
533036      C FCC          R      fraction of vmt in cold start mode, vehicle catalyst equipped
533037      C FCN          R      fraction of vmt in cold start mode, non-catalyst equipped
533038      C FHC          R      fraction of vmt in hot start mode, catalyst equipped
533039      C FHN          R      fraction of vmt in hot start mode, non-catalyst equipped
533040      C
533041      C Notes:
533042      C
533043      C BD 33 was added for MOBILE4.
533044      C BD 33 was modified for MOBILE4.
533045      C
533046      C
533047      C COMMON /REGION/ FEET(2),IREJN,ALT,INITPR
533048      C COMMON /SCENE1/ SPD(8),PCCN,PCHC,PCCC
533049      C COMMON /SCENE2/ FCC,FCN,FHC,FHN
533050      C
533051      C Only FEET and INITPR need to be initialized.
533052      C
533053      C DATA FEET/500.,5500./,INITPR/1/
533054      C
533055      C The rest are read in or set during execution, so dummy zeroes are used here.
533056      C
533057      C DATA IREJN,ALT/2*0/

```

Appendix C: MOBILE4 Block Data 33

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533058
533059
533060
533061

C

DATA SPD,PCCN,PCHC,PCCC/11*0.0/
DATA FCC,FCN,FHC,FHN/4*0.0/
END


```

534000      BLOCK DATA BD34
534001      C
534002      C BLOCK DATA Subprogram 34: /RUNLS1/,/RUNSL2/,/RUNLS3/,
534003      C                               /RUNLS4/,/RUNLS5/
534004      C
534005      C BLOCK DATA initializes running loss HC emissions data and parameters.
534006      C
534007      C Common block array subscripts:
534008      C
534009      C MYGRUL (4,4)      - MYGRUL ( IGTL, IVTL )
534010      C RULBAS (4,4,4,4) - RULBAS ( ITLR, ITLT, IGTL, IVTL )
534011      C RULRVP (4)      - RULRVP ( ITLR )
534012      C RULCAN (4,4)     - RULCAN ( ITLR, ITLT )
534013      C RULCAP (4,4)    - RULCAP ( ITLR, ITLT )
534014      C RULTEM (4)     - RULTEM ( ITLT )
534015      C TLEMI (13,4,4,4,4) - TLEMI ( ITL, ITLR, ITLT, IGTL, IVTL )
534016      C TLCAN (13,4,4)   - TLCAN ( ITL, ITLR, ITLT )
534017      C TLCAP (13,4,4)  - TLCAP ( ITL, ITLR, ITLT )
534018      C TLVMT (13)      - TLVMT ( ITL )
534019      C
534020      C Common block dictionary:
534021      C
534022      C      Name      Type      Description
534023      C      -----
534024      C /RUNLS1/:
534025      C
534026      C TLVMT      R      Urban type normalized %VMT by trip length (driving cycle case)
534027      C TLEMI      R      g/mi running loss emissions, by trip length, RVP, temperature,
534028      C                      MYG and vehicle class
534029      C MAXTL      I      maximum number of trip length cases
534030      C
534031      C /RUNLS2/:
534032      C
534033      C TLCAN      R      running losses due to canister tampering, by trip length,
534034      C                      RVP and temperature
534035      C TLCAP      R      running losses due to gas cap tampering, by trip length,
534036      C                      RVP and temperature
534037      C
534038      C /RUNLS3/:
534039      C
534040      C RULBAS      R      trip length weighted g/mi running loss HC emissions, by RVP,
534041      C                      temperature, MYG and vehicle class
534042      C RULCAN      R      trip length weighted running loss HC emissions due
534043      C                      to canister disconnect tampering, by RVP and temperature
534044      C RULCAP      R      trip length weighted running loss HC emissions due
534045      C                      to gas cap removal tampering, by RVP and temperature
534046      C
534047      C /RUNLS4/:
534048      C
534049      C MYGRUL      I      running loss emission HC rate MYGs
534050      C MAXRUL      I      maximum number of running loss HC emission rate MYGs
534051      C
534052      C /RUNLS5/:
534053      C
534054      C RULRVP      R      running loss HC RVP measurement values
534055      C RULTEM      R      running loss HC temperature measurement values
534056      C
534057      C Local array subscripts:

```

```

534058 C
534059 C TL<I><J>(13,4,4) - TL<I><J> (ITL,ITLR,ITLT)
534060 C
534061 C where I = IGTL and J = IVTL
534062 C
534063 C RULB1<K>(4,4,4) - RULB1<K> (ITLR,ITLT,IGTL)
534064 C
534065 C where K = IVTL
534066 C
534067 C Local array dictionary:
534068 C
534069 C The TL<I><J> arrays are the IGTL x IVTL subsets (currently 16) of the by
534070 C trip length running loss emission impact rates stored in TLEMI:
534071 C
534072 C TLEMI(1,1,1,<I>,<J>) EQU to TL<I><J>(1,1,1)
534073 C
534074 C The RULB1<K> & RULB2<K> arrays are the IVTL subsets of the trip length
534075 C weighted base running loss HC emissions stored in RULBAS:
534076 C
534077 C RULBAS(1,1,1,<K>) EQU to RULB1<K>(1,1,1)
534078 C
534079 C Notes:
534080 C
534081 C BD 34 was added for MOBILE4.
534082 C
534083 C
534084 COMMON /RUNLS1/ TLVMT(13),TLEMI(13,4,4,4,4),MAXTL
534085 COMMON /RUNLS2/ TLCAN(13,4,4),TLCAP(13,4,4)
534086 COMMON /RUNLS3/ RULBAS(4,4,4,4),RULCAN(4,4),RULCAP(4,4)
534087 COMMON /RUNLS4/ MYGRUL(4,4),MAXRUL
534088 COMMON /RUNLS5/ RULRVP(4),RULTEM(4)
534089 C
534090 DIMENSION
534091 * TL11(13,4,4),TL12(13,4,4),TL13(13,4,4),TL14(13,4,4),
534092 * TL21(13,4,4),TL22(13,4,4),TL23(13,4,4),TL24(13,4,4),
534093 * TL31(13,4,4),TL32(13,4,4),TL33(13,4,4),TL34(13,4,4),
534094 * TL41(13,4,4),TL42(13,4,4),TL43(13,4,4),TL44(13,4,4)
534095 C
534096 DIMENSION
534097 * RULB11(4,4,4),RULB12(4,4,4),RULB13(4,4,4),RULB14(4,4,4)
534098 C
534099 EQUIVALENCE
534100 * (TLEMI(1,1,1,1,1),TL11(1,1,1)),(TLEMI(1,1,1,1,2),TL12(1,1,1)),
534101 * (TLEMI(1,1,1,2,1),TL21(1,1,1)),(TLEMI(1,1,1,2,2),TL22(1,1,1)),
534102 * (TLEMI(1,1,1,3,1),TL31(1,1,1)),(TLEMI(1,1,1,3,2),TL32(1,1,1)),
534103 * (TLEMI(1,1,1,4,1),TL41(1,1,1)),(TLEMI(1,1,1,4,2),TL42(1,1,1)),
534104 * (TLEMI(1,1,1,1,3),TL13(1,1,1)),(TLEMI(1,1,1,1,4),TL14(1,1,1)),
534105 * (TLEMI(1,1,1,2,3),TL23(1,1,1)),(TLEMI(1,1,1,2,4),TL24(1,1,1)),
534106 * (TLEMI(1,1,1,3,3),TL33(1,1,1)),(TLEMI(1,1,1,3,4),TL34(1,1,1)),
534107 * (TLEMI(1,1,1,4,3),TL43(1,1,1)),(TLEMI(1,1,1,4,4),TL44(1,1,1))
534108 C
534109 EQUIVALENCE
534110 * (RULBAS(1,1,1,1),RULB11(1,1,1)),
534111 * (RULBAS(1,1,1,2),RULB12(1,1,1)),
534112 * (RULBAS(1,1,1,3),RULB13(1,1,1)),
534113 * (RULBAS(1,1,1,4),RULB14(1,1,1))
534114 C
534115 C /RUNLS1/: trip length data - input code may be added to all user's TLVMT.

```

534116 C
 534117 DATA TLVMT/
 534118 C NYCC
 534119 1 0.0078,0.0405,0.0160,0.0105,0.0161,0.0456,
 534120 C LA-4
 534121 2 0.0830,0.2046,0.1055,0.0996,0.0486,0.1943,
 534122 C HFET
 534123 3 0.1279/
 534124 C
 534125 C The continuation line code for TLEMI is ITLR:
 534126 C
 534127 C 1 = 7.0 2 = 9.0 3 = 10.4 4 = 11.7
 534128 C
 534129 C Default values are assigned for 87F and 105F due to insufficient data.
 534130 C
 534131 C LDGV - up through 1977
 534132 C
 534133 DATA TL11/
 534134 C 80 degrees
 534135 1 0.34,0.45,0.49,0.49,0.41,0.28,0.31,0.44,0.44,0.33,0.27,0.19,.02,
 534136 2 0.65,0.79,0.70,0.76,0.62,0.41,0.59,0.77,0.64,0.50,0.40,0.28,.02,
 534137 3 0.78,1.13,1.41,1.66,1.32,0.93,0.71,1.11,1.27,1.10,0.85,0.63,.02,
 534138 4 1.32,2.25,3.06,4.48,4.14,3.44,1.20,2.21,2.77,2.97,2.65,2.34,.02,
 534139 C 87 degrees
 534140 1 13*0.49,
 534141 2 13*1.15,
 534142 3 13*2.04,
 534143 4 13*2.85,
 534144 C 95 degrees
 534145 1 0.84,1.43,1.44,1.38,1.17,1.06,0.77,1.37,1.37,1.32,1.11,0.98,.02,
 534146 2 1.96,3.10,2.99,2.99,2.78,2.78,1.78,2.98,2.85,2.86,2.64,2.58,.02,
 534147 3 1.93,3.22,3.61,6.30,5.44,4.94,1.76,3.16,3.27,4.17,3.48,3.36,.02,
 534148 4 2.76,6.08,7.85,12.11,11.83,10.74,2.51,5.97,7.11,8.02,7.56,7.31,
 534149 4 .02,
 534150 C 105 degrees
 534151 1 13*1.60,
 534152 2 13*3.60,
 534153 3 13*4.10,
 534154 4 13*9.87/
 534155 C
 534156 C LDGV - 1978-80
 534157 C
 534158 DATA TL21/
 534159 C 80 degrees
 534160 1 0.29,0.38,0.36,0.40,0.35,0.24,0.26,0.37,0.31,0.23,0.20,0.16,.02,
 534161 2 0.55,0.67,0.51,0.62,0.53,0.36,0.49,0.65,0.45,0.36,0.30,0.23,.02,
 534162 3 0.67,0.96,1.03,1.35,1.12,0.82,0.60,0.94,0.90,0.79,0.64,0.53,.02,
 534163 4 1.13,1.91,2.23,3.64,3.50,3.04,1.01,1.87,1.95,2.13,2.00,1.95,.02,
 534164 C 87 degrees
 534165 1 13*0.42,
 534166 2 13*1.20,
 534167 3 13*1.70,
 534168 4 13*2.30,
 534169 C 95 degrees
 534170 1 0.81,1.40,1.32,1.21,1.06,0.97,0.74,1.34,1.25,1.15,1.00,0.90,.02,
 534171 2 1.89,3.04,2.74,2.64,2.52,2.56,1.71,2.92,2.60,2.51,2.38,2.36,.02,
 534172 3 1.65,2.73,2.64,5.12,4.60,4.37,1.48,2.68,2.30,2.99,2.63,2.80,.02,
 534173 4 2.36,5.16,5.73,9.84,9.99,9.51,2.11,5.05,4.99,5.75,5.72,6.08,.02,

534174 C 105 degrees
 534175 1 13*1.39,
 534176 2 13*2.88,
 534177 3 13*3.23,
 534178 4 13*7.90/
 534179 C
 534180 C LDGV - 1981+
 534181 C
 534182 DATA TL31/
 534183 C 80 degrees
 534184 1 0.53,0.34,0.39,0.39,0.44,0.38,0.11,0.13,0.12,0.13,0.13,0.13,.02,
 534185 2 1.01,0.61,0.58,0.61,0.68,0.59,0.20,0.23,0.18,0.20,0.20,0.20,.02,
 534186 3 1.21,0.86,1.03,1.41,1.24,1.11,0.24,0.33,0.36,0.43,0.43,0.44,.02,
 534187 4 2.08,1.70,2.13,3.00,3.76,4.28,0.42,0.65,0.78,1.18,1.35,1.61,.02,
 534188 C 87 degrees
 534189 1 13*0.20,
 534190 2 13*0.40,
 534191 3 13*0.97,
 534192 4 13*1.60,
 534193 C 95 degrees
 534194 1 0.88,0.75,2.32,1.87,1.54,1.28,0.17,0.18,0.17,0.17,0.15,0.16,.02,
 534195 2 1.03,1.71,4.85,4.10,3.63,3.40,0.40,0.40,0.35,0.38,0.37,0.42,.02,
 534196 3 3.03,2.49,2.74,4.73,5.55,6.91,0.61,0.93,0.92,1.67,1.78,2.31,.02,
 534197 4 4.34,4.71,6.02,9.08,11.72,14.67,0.87,1.75,1.99,3.20,3.87,5.01,
 534198 4 .02,
 534199 C 105 degrees
 534200 1 13*0.65,
 534201 2 13*2.05,
 534202 3 13*2.52,
 534203 4 13*5.65/
 534204 C
 534205 C LDGT1 - up through 1977
 534206 C
 534207 DATA TL12/
 534208 C 80 degrees
 534209 1 0.34,0.45,0.49,0.49,0.41,0.28,0.31,0.44,0.44,0.33,0.27,0.19,.02,
 534210 2 0.65,0.79,0.70,0.76,0.62,0.41,0.59,0.77,0.64,0.50,0.40,0.28,.02,
 534211 3 0.78,1.13,1.41,1.66,1.32,0.93,0.71,1.11,1.27,1.10,0.85,0.63,.02,
 534212 4 1.32,2.25,3.06,4.48,4.14,3.44,1.20,2.21,2.77,2.97,2.65,2.34,.02,
 534213 C 87 degrees
 534214 1 13*0.49,
 534215 2 13*1.15,
 534216 3 13*2.04,
 534217 4 13*2.85,
 534218 C 95 degrees
 534219 1 0.84,1.43,1.44,1.38,1.17,1.06,0.77,1.37,1.37,1.32,1.11,0.98,.02,
 534220 2 1.96,3.10,2.99,2.99,2.78,2.78,1.78,2.98,2.85,2.86,2.64,2.58,.02,
 534221 3 1.93,3.22,3.61,6.30,5.44,4.94,1.76,3.16,3.27,4.17,3.48,3.36,.02,
 534222 4 2.76,6.08,7.85,12.11,11.83,10.74,2.51,5.97,7.11,8.02,7.56,7.31,
 534223 4 .02,
 534224 C 105 degrees
 534225 1 13*1.60,
 534226 2 13*3.60,
 534227 3 13*4.10,
 534228 4 13*9.87/
 534229 C
 534230 C LDGT1 - 1978-80
 534231 C

534232 DATA TL22/
 534233 C 80 degrees
 534234 1 0.29,0.38,0.36,0.40,0.35,0.24,0.26,0.37,0.31,0.23,0.20,0.16,.02,
 534235 2 0.55,0.67,0.51,0.62,0.53,0.36,0.49,0.65,0.45,0.36,0.30,0.23,.02,
 534236 3 0.67,0.96,1.03,1.35,1.12,0.82,0.60,0.94,0.90,0.79,0.64,0.53,.02,
 534237 4 1.13,1.91,2.23,3.64,3.50,3.04,1.01,1.87,1.95,2.13,2.00,1.95,.02,
 534238 C 87 degrees
 534239 1 13*0.42,
 534240 2 13*1.20,
 534241 3 13*1.70,
 534242 4 13*2.30,
 534243 C 95 degrees
 534244 1 0.81,1.40,1.32,1.21,1.06,0.97,0.74,1.34,1.25,1.15,1.00,0.90,.02,
 534245 2 1.89,3.04,2.74,2.64,2.52,2.56,1.71,2.92,2.60,2.51,2.38,2.36,.02,
 534246 3 1.65,2.73,2.64,5.12,4.60,4.37,1.48,2.68,2.30,2.99,2.63,2.80,.02,
 534247 4 2.36,5.16,5.73,9.84,9.99,9.51,2.11,5.05,4.99,5.75,5.72,6.08,.02,
 534248 C 105 degrees
 534249 1 13*1.39,
 534250 2 13*2.88,
 534251 3 13*3.23,
 534252 4 13*7.90/
 534253 C
 534254 C LDGT1 - 1981+
 534255 C
 534256 DATA TL32/
 534257 C 80 degrees
 534258 1 0.44,0.23,0.26,0.25,0.29,0.26,0.01,0.01,0.01,0.01,0.01,0.01,.02,
 534259 2 0.83,0.40,0.37,0.38,0.43,0.39,0.01,.02,0.01,0.01,.02,0.01,.02,
 534260 3 1.00,0.57,0.75,0.84,0.91,0.87,.02,0.03,0.03,0.03,0.03,0.03,.02,
 534261 4 1.70,1.14,1.63,2.26,2.85,3.21,0.03,0.05,0.06,0.08,0.10,0.12,.02,
 534262 C 87 degrees
 534263 1 13*0.06,
 534264 2 13*0.13,
 534265 3 13*0.30,
 534266 4 13*0.47,
 534267 C 95 degrees
 534268 1 0.30,0.63,2.19,1.74,1.40,1.17,0.03,0.03,0.03,0.03,0.03,0.03,.02,
 534269 2 0.69,1.38,4.56,3.79,3.34,3.07,0.06,0.07,0.06,0.07,0.08,0.09,.02,
 534270 3 2.48,1.64,1.93,3.17,3.74,4.62,0.05,0.07,0.07,0.11,0.13,0.17,.02,
 534271 4 3.54,3.09,4.19,6.10,8.13,10.04,0.07,0.13,0.16,0.22,0.28,0.38,
 534272 4 .02,
 534273 C 105 degrees
 534274 1 13*0.20,
 534275 2 13*0.62,
 534276 3 13*0.75,
 534277 4 13*1.73/
 534278 C
 534279 C LDGT2 - up through 1978
 534280 C
 534281 DATA TL13/
 534282 C 80 degrees
 534283 1 0.34,0.45,0.49,0.49,0.41,0.28,0.31,0.44,0.44,0.33,0.27,0.19,.02,
 534284 2 0.65,0.79,0.70,0.76,0.62,0.41,0.59,0.77,0.64,0.50,0.40,0.28,.02,
 534285 3 0.78,1.13,1.41,1.66,1.32,0.93,0.71,1.11,1.27,1.10,0.85,0.63,.02,
 534286 4 1.32,2.25,3.06,4.48,4.14,3.44,1.20,2.21,2.77,2.97,2.65,2.34,.02,
 534287 C 87 degrees
 534288 1 13*0.49,
 534289 2 13*1.15,

534290 3 13*2.04,
 534291 4 13*2.85,
 534292 C 95 degrees
 534293 1 0.84,1.43,1.44,1.38,1.17,1.06,0.77,1.37,1.37,1.32,1.11,0.98,.02,
 534294 2 1.96,3.10,2.99,2.99,2.78,2.78,1.78,2.98,2.85,2.86,2.64,2.58,.02,
 534295 3 1.93,3.22,3.61,6.30,5.44,4.94,1.76,3.16,3.27,4.17,3.48,3.36,.02,
 534296 4 2.76,6.08,7.85,12.11,11.83,10.74,2.51,5.97,7.11,8.02,7.56,7.31,
 534297 4 .02,
 534298 C 105 degrees
 534299 1 13*1.60,
 534300 2 13*3.60,
 534301 3 13*4.10,
 534302 4 13*9.87/
 534303 C
 534304 C LDGT2 - 1979-80
 534305 C
 534306 DATA TL23/
 534307 C 80 degrees
 534308 1 0.29,0.38,0.36,0.40,0.35,0.24,0.26,0.37,0.31,0.23,0.20,0.16,.02,
 534309 2 0.55,0.67,0.51,0.62,0.53,0.36,0.49,0.65,0.45,0.36,0.30,0.23,.02,
 534310 3 0.67,0.96,1.03,1.35,1.12,0.82,0.60,0.94,0.90,0.79,0.64,0.53,.02,
 534311 4 1.13,1.91,2.23,3.64,3.50,3.04,1.01,1.87,1.95,2.13,2.00,1.95,.02,
 534312 C 87 degrees
 534313 1 13*0.42,
 534314 2 13*1.20,
 534315 3 13*1.70,
 534316 4 13*2.30,
 534317 C 95 degrees
 534318 1 0.81,1.40,1.32,1.21,1.06,0.97,0.74,1.34,1.25,1.15,1.00,0.90,.02,
 534319 2 1.89,3.04,2.74,2.64,2.52,2.56,1.71,2.92,2.60,2.51,2.38,2.36,.02,
 534320 3 1.65,2.73,2.64,5.12,4.60,4.37,1.48,2.68,2.30,2.99,2.63,2.80,.02,
 534321 4 2.36,5.16,5.73,9.84,9.99,9.51,2.11,5.05,4.99,5.75,5.72,6.08,.02,
 534322 C 105 degrees
 534323 1 13*1.39,
 534324 2 13*2.88,
 534325 3 13*3.23,
 534326 4 13*7.90/
 534327 C
 534328 C LDGT2 - 1981+
 534329 C
 534330 DATA TL33/
 534331 C 80 degrees
 534332 1 0.44,0.23,0.26,0.25,0.29,0.26,0.01,0.01,0.01,0.01,0.01,0.01,.02,
 534333 2 0.83,0.40,0.37,0.38,0.43,0.39,0.01,.02,0.01,0.01,.02,0.01,.02,
 534334 3 1.00,0.57,0.75,0.84,0.91,0.87,.02,0.03,0.03,0.03,0.03,0.03,.02,
 534335 4 1.70,1.14,1.63,2.26,2.85,3.21,0.03,0.05,0.06,0.08,0.10,0.12,.02,
 534336 C 87 degrees
 534337 1 13*0.06,
 534338 2 13*0.13,
 534339 3 13*0.30,
 534340 4 13*0.47,
 534341 C 95 degrees
 534342 1 0.30,0.63,2.19,1.74,1.40,1.17,0.03,0.03,0.03,0.03,0.03,0.03,.02,
 534343 2 0.69,1.38,4.56,3.79,3.34,3.07,0.06,0.07,0.06,0.07,0.08,0.09,.02,
 534344 3 2.48,1.64,1.93,3.17,3.74,4.62,0.05,0.07,0.07,0.11,0.13,0.17,.02,
 534345 4 3.54,3.09,4.19,6.10,8.13,10.04,0.07,0.13,0.16,0.22,0.28,0.38,
 534346 4 .02,
 534347 C 105 degrees

534348 1 13*0.20,
 534349 2 13*0.62,
 534350 3 13*0.75,
 534351 4 13*1.73/
 534352 C
 534353 C HDGV - up through 1984
 534354 C
 534355 DATA TL14/
 534356 C 80 degrees
 534357 1 0.34,0.45,0.49,0.49,0.41,0.28,0.31,0.44,0.44,0.33,0.27,0.19,.02,
 534358 2 0.65,0.79,0.70,0.76,0.62,0.41,0.59,0.77,0.64,0.50,0.40,0.28,.02,
 534359 3 0.78,1.13,1.41,1.66,1.32,0.93,0.71,1.11,1.27,1.10,0.85,0.63,.02,
 534360 4 1.32,2.25,3.06,4.48,4.14,3.44,1.20,2.21,2.77,2.97,2.65,2.34,.02,
 534361 C 87 degrees
 534362 1 13*0.49,
 534363 2 13*1.15,
 534364 3 13*2.04,
 534365 4 13*2.85,
 534366 C 95 degrees
 534367 1 0.84,1.43,1.44,1.38,1.17,1.06,0.77,1.37,1.37,1.32,1.11,0.98,.02,
 534368 2 1.96,3.10,2.99,2.99,2.78,2.78,1.78,2.98,2.85,2.86,2.64,2.58,.02,
 534369 3 1.93,3.22,3.61,6.30,5.44,4.94,1.76,3.16,3.27,4.17,3.48,3.36,.02,
 534370 4 2.76,6.08,7.85,12.11,11.83,10.74,2.51,5.97,7.11,8.02,7.56,7.31,
 534371 4 .02,
 534372 C 105 degrees
 534373 1 13*1.60,
 534374 2 13*3.60,
 534375 3 13*4.10,
 534376 4 13*9.87/
 534377 C
 534378 C HDGV - 1985+
 534379 C
 534380 DATA TL24/
 534381 C 80 degrees
 534382 1 0.29,0.38,0.36,0.40,0.35,0.24,0.26,0.37,0.31,0.23,0.20,0.16,.02,
 534383 2 0.55,0.67,0.51,0.62,0.53,0.36,0.49,0.65,0.45,0.36,0.30,0.23,.02,
 534384 3 0.67,0.96,1.03,1.35,1.12,0.82,0.60,0.94,0.90,0.79,0.64,0.53,.02,
 534385 4 1.13,1.91,2.23,3.64,3.50,3.04,1.01,1.87,1.95,2.13,2.00,1.95,.02,
 534386 C 87 degrees
 534387 1 13*0.42,
 534388 2 13*1.20,
 534389 3 13*1.70,
 534390 4 13*2.30,
 534391 C 95 degrees
 534392 1 0.81,1.40,1.32,1.21,1.06,0.97,0.74,1.34,1.25,1.15,1.00,0.90,.02,
 534393 2 1.89,3.04,2.74,2.64,2.52,2.56,1.71,2.92,2.60,2.51,2.38,2.36,.02,
 534394 3 1.65,2.73,2.64,5.12,4.60,4.37,1.48,2.68,2.30,2.99,2.63,2.80,.02,
 534395 4 2.36,5.16,5.73,9.84,9.99,9.51,2.11,5.05,4.99,5.75,5.72,6.08,.02,
 534396 C 105 degrees
 534397 1 13*1.39,
 534398 2 13*2.88,
 534399 3 13*3.23,
 534400 4 13*7.90/
 534401 C
 534402 DATA TL34/208*0.00/
 534403 C
 534404 DATA MAXTL/13/
 534405 C

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534406 C /RUNLS2/: tampered running loss data
534407 C
534408 C
534409 C The continuation line code for TLCAN & TLCAP is ITLR:
534410 C
534411 C 1 = 7.0 2 = 9.0 3 = 10.4 4 = 11.7
534412 C
534413 C Default values are assigned for 87F and 105F due to insufficient data.
534414 C
534415 C Tampering emission impacts (for evaporative cannister removal, ID=6),
534416 C combined with the corresponding tampering rate from THS to get the offset.
534417 C
534418 C DATA TLCAN/
534419 C 80 degrees
534420 1 0.25,0.45,0.43,0.39,0.37,0.32,0.25,0.45,0.43,0.39,0.37,0.32,0.0,
534421 2 0.47,0.78,0.61,0.60,0.55,0.48,0.47,0.78,0.61,0.60,0.55,0.48,0.0,
534422 3 0.57,1.12,1.23,1.31,1.17,1.07,0.57,1.12,1.23,1.31,1.17,1.07,0.0,
534423 4 0.96,2.24,2.67,3.53,3.65,3.96,0.96,2.24,2.67,3.53,3.65,3.96,0.0,
534424 C 87 degrees
534425 1 13*0.42,
534426 2 13*1.30,
534427 3 13*2.36,
534428 4 13*3.37,
534429 C 95 degrees
534430 1 0.40,1.22,1.35,1.27,1.01,0.80,0.40,1.22,1.35,1.27,1.01,0.80,0.0,
534431 2 0.94,2.66,2.81,2.77,2.40,2.10,0.94,2.66,2.81,2.77,2.40,2.10,0.0,
534432 3 1.39,3.21,3.15,4.96,4.80,5.69,1.39,3.21,3.15,4.96,4.80,5.69,0.0,
534433 4 1.99,6.05,6.85,9.54,10.43,12.38,1.99,6.05,6.85,9.54,10.43,12.38,
534434 4 0.0,
534435 C 105 degrees
534436 1 13*1.85,
534437 2 13*4.29,
534438 3 13*4.97,
534439 4 13*11.97/
534440 C
534441 C Tampering emission impacts (for evaporative gas cap removal, ID=8),
534442 C combined with the corresponding tampering rate from THS to get the offset.
534443 C
534444 C DATA TLCAP/
534445 C 80 degrees
534446 1 13*0.60,
534447 2 13*1.23,
534448 3 13*2.09,
534449 4 13*3.62,
534450 C 87 degrees
534451 1 13*0.84,
534452 2 13*1.85,
534453 3 13*3.43,
534454 4 13*17.28,
534455 C 95 degrees
534456 1 13*1.28,
534457 2 13*3.31,
534458 3 13*15.30,
534459 4 13*44.93,
534460 C 105 degrees
534461 1 13*2.44,
534462 2 13*15.58,
534463 3 13*28.51,

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534464      4 13#44.93/
534465      C
534466      C /RUNLS3/: RULBAS's values are used as is, unless replaced via TLFLAG=2.
534467      C
534468      C The continuation line code for RULBAS, RULCAN and RULCAP is ITLT:
534469      C
534470      C 1 = 80      2 = 87      3 = 95      4 = 105
534471      C
534472      C
534473      C          RVP:   7.0      9.0      10.4      11.7
534474      C LDGV
534475      DATA RULB11/
534476      C up through 1970
534477          1          0.36, 0.58, 1.06, 2.88,
534478          2          0.52, 1.50, 2.70, 3.85,
534479          3          1.13, 2.62, 4.00, 8.20,
534480          4          2.16, 4.81, 5.63, 13.64,
534481      C 1971 - 1977
534482          1          0.30, 0.49, 0.85, 2.15,
534483          2          0.49, 1.15, 2.04, 2.85,
534484          3          1.04, 2.37, 2.96, 5.97,
534485          4          1.60, 3.60, 4.10, 9.87,
534486      C * 1978 - 1980
534487          1          0.24, 0.39, 0.68, 1.72,
534488          2          0.42, 1.20, 1.70, 2.30,
534489          3          0.97, 2.21, 2.38, 4.79,
534490          4          1.39, 2.88, 3.23, 7.90,
534491      C 1981+
534492          1          0.15, 0.24, 0.42, 1.16,
534493          2          0.20, 0.40, 0.97, 1.60,
534494          3          0.30, 0.70, 1.66, 3.40,
534495          4          0.65, 2.05, 2.52, 5.65/
534496      C
534497      C LDGT1
534498      DATA RULB12/
534499      C up through 1970
534500          1          0.36, 0.58, 1.06, 2.88,
534501          -2          0.52, 1.50, 2.70, 3.85,
534502          3          1.13, 2.62, 4.00, 8.20,
534503          4          2.16, 4.81, 5.63, 13.64,
534504      C 1971 - 1977
534505          1          0.30, 0.49, 0.85, 2.15,
534506          2          0.49, 1.15, 2.04, 2.85,
534507          3          1.04, 2.37, 2.96, 5.97,
534508          4          1.60, 3.60, 4.10, 9.87,
534509      C 1978 - 1980
534510          1          0.24, 0.39, 0.68, 1.72,
534511          2          0.42, 1.20, 1.70, 2.30,
534512          3          0.97, 2.21, 2.38, 4.79,
534513          4          1.39, 2.88, 3.23, 7.90,
534514      C 1981+
534515          1          0.05, 0.07, 0.13, 0.36,
534516          2          0.06, 0.13, 0.30, 0.47,
534517          3          0.18, 0.42, 0.50, 1.03,
534518          4          0.20, 0.62, 0.75, 1.73/
534519      C
534520      C LDGT2
534521      DATA RULB13/

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534522 C up through 1978
534523 1 0.36, 0.58, 1.06, 2.88,
534524 2 0.52, 1.50, 2.70, 3.85,
534525 3 1.13, 2.62, 4.00, 8.20,
534526 4 2.16, 4.81, 5.63, 13.64,
534527 C 1978 - 1980
534528 1 0.24, 0.39, 0.68, 1.72,
534529 2 0.42, 1.20, 1.70, 2.30,
534530 3 0.97, 2.21, 2.38, 4.79,
534531 4 1.39, 2.88, 3.23, 7.90,
534532 C 1981+
534533 1 0.05, 0.07, 0.13, 0.36,
534534 2 0.06, 0.13, 0.30, 0.47,
534535 3 0.18, 0.42, 0.50, 1.03,
534536 4 0.20, 0.62, 0.75, 1.73,
534537 C LDGT2 has only 3 MYGs.
534538 * 16*0.00/
534539 C
534540 C HDGV
534541 DATA RULB14/
534542 C up through 1984
534543 1 0.36, 0.58, 1.06, 2.88,
534544 2 0.52, 1.50, 2.70, 3.85,
534545 3 1.13, 2.62, 4.00, 8.20,
534546 4 2.16, 4.81, 5.63, 13.64,
534547 C 1985+
534548 1 0.24, 0.39, 0.68, 1.72,
534549 2 0.42, 1.20, 1.70, 2.30,
534550 3 0.97, 2.21, 2.38, 4.79,
534551 4 1.39, 2.88, 3.23, 7.90,
534552 C HDGV has only 2 MYGs.
534553 * 32*0.00/
534554 C
534555 DATA RULCAN/
534556 1 0.33, 0.52, 0.95, 2.54,
534557 2 0.42, 1.30, 2.36, 3.37,
534558 3 0.90, 2.04, 3.52, 7.19,
534559 4 1.85, 4.29, 4.97, 11.97/
534560 C
534561 DATA RULCAP/
534562 1 0.60, 1.23, 2.09, 3.62,
534563 2 0.84, 1.85, 3.43, 17.28,
534564 3 1.28, 3.31, 15.30, 44.93,
534565 4 2.44, 15.58, 28.51, 44.93/
534566 C
534567 C /RUNLS4/: The continuation line code for MYGRUL is IVTL.
534568 C
534569 DATA MYGRUL/
534570 1 1970,1977,1980,2020,
534571 2 1970,1977,1980,2020,
534572 3 1978,1980,2020,0000,
534573 4 1984,2020,0000,0000/
534574 C
534575 DATA MAXRUL/4/
534576 C
534577 C /RUNLS5/:
534578 C
534579 DATA RULRVP/7.0,9.0,10.4,11.7/

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534580
534581
534582

C

DATA RULTEM/80.0,87.0,95.0,105.0/

END